CD4066B CMOS Quad Bilateral Switch

1 Features

- 15V digital or ±7.5V peak-to-peak switching
- 125Ω typical on-state resistance for 15V operation
- Switch on-state resistance matched to within 5Ω over 15V signal-input range
- On-state resistance flat over full peak-to-peak signal range
- High on or off output-voltage ratio: 80dB typical at f_{is} = 10kHz, R_L = 1kΩ
- High degree of linearity: <0.5% distortion typical at f_{is} = 1kHz, V_{is} = $5V_{p-p}$ $V_{DD} – V_{SS} \geq 10V$, R_L = 10kΩ
- Extremely low off-state switch leakage, resulting in very low offset current and high effective off-state resistance: 10 pA typical at $V_{DD} – V_{SS}$ = 10V, T_A = 25°C
- Extremely high control input impedance (control circuit isolated from signal circuit): 10^{12}Ω typical
- Low crosstalk between switches: –50dB typical at f_{is} = 8MHz, R_L = 1kΩ
- Matched control-input to signal-output capacitance: reduces output signal transients
- Frequency response, switch On = 40MHz typical
- 100% tested for quiescent current at 20V
- 5V, 10V, and 15V parametric ratings

2 Applications

- Analog signal switching and multiplexing: signal gating, modulators, squelch controls, demodulators, choppers, commutating switches
- Digital signal switching and multiplexing
- Analog-to-digital and digital-to-analog conversions
- Digital control of frequency, impedance, phase, and analog-signal gain
- Building automation

3 Description

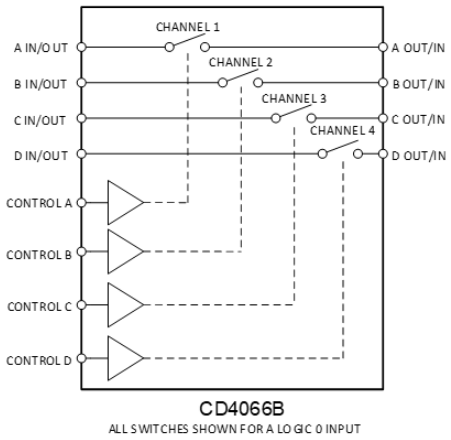
The CD4066B device is a quad bilateral switch intended for the transmission or multiplexing of analog or digital signals. It is pin-for-pin compatible with the CD4016B device, but exhibits a much lower on-state resistance. In addition, the on-state resistance is relatively constant over the full signal-input range.

The CD4066B device consists of four bilateral switches, each with independent controls. Wide operating supply of 3V to 18V allows for use in a broad array of applications. The advantages over single-channel switches include peak input-signal voltage swings equal to the full supply voltage and more constant on-state impedance over the input-signal range. However, for sample-and-hold applications, the CD4016B device is recommended.

Package Information

PART NUMBER	PACKAGE(1)	PACKAGE SIZE(2)
CD4066B	N (PDIP, 14)	19.3mm × 9.4mm
	D (SOIC, 14)	8.65mm × 6mm
	NS (SOP, 14)	10.2mm × 7.8mm
	PW (TSSOP, 14)	5mm × 6.4mm

(1) For more information, see Section 11
(2) The package size (length × width) is a nominal value and includes pins, where applicable.



Bidirectional Signal Transmission Through Digital Control Logic

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.

Table of Contents

1 Features....1
2 Applications....1
3 Description....1
4 Pin Configuration and Functions....3
5 Specifications....4
5.1 Absolute Maximum Ratings....4
5.2 ESD Ratings....4
5.3 Recommended Operating Conditions....4
5.4 Thermal Information....5
5.5 Electrical Characteristics....5
5.6 Switching Characteristics....8
5.7 Typical Characteristics....9
6 Parameter Measurement Information....10
7 Detailed Description....14
7.1 Overview....14
7.2 Functional Block Diagram....14
7.3 Feature Description....14
7.4 Device Functional Modes....15
8 Application and Implementation....16
8.1 Application Information....16
8.2 Typical Application....16
8.3 Power Supply Recommendations....17
8.4 Layout....17
9 Device and Documentation Support....18
9.1 Receiving Notification of Documentation Updates....18
9.2 Support Resources....18
9.3 Trademarks....18
9.4 Electrostatic Discharge Caution....18
9.5 Glossary....18
10 Revision History....18
11 Mechanical, Packaging, and Orderable Information....18

Copyright © 2024 Texas Instruments Incorporated

4 Pin Configuration and Functions

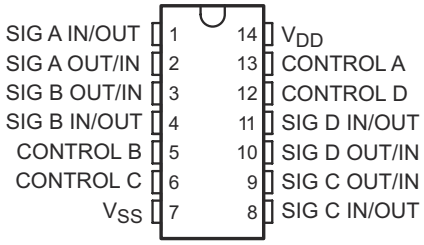


Figure 4-1. N, J, D, NS, or PW Packages 14-Pin PDIP, CDIP, SOIC, SOP, or TSSOP (Top View)

Table 4-1. Pin Functions

PIN		TYPE[1]	DESCRIPTION
NAME	NO.		
SIG A IN/OUT	1	I/O	Input/Output for Switch A
SIG A OUT/IN	2	I/O	Output/Input for Switch A
SIG B OUT/IN	3	I/O	Output/Input for Switch B
SIG B IN/OUT	4	I/O	Input/Output for Switch B
CONTROL B	5	I	Control pin for Switch B
CONTROL C	6	I	Control pin for Switch C
V_{SS}	7	—	Low Voltage Power Pin
SIG C IN/OUT	8	I/O	Input/Output for Switch C
SIG C OUT/IN	9	I/O	Output/Input for Switch C
SIG D OUT/IN	10	I/O	Output/Input for Switch D
SIG D IN/OUT	11	I/O	Input/Output for Switch D
CONTROL D	12	I	Control Pin for D
CONTROL A	13	I	Control Pin for A
V_{DD}	14	—	Power Pin

(1) I = input, O = output

Copyright © 2024 Texas Instruments Incorporated

5 Specifications

5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1) (2)

		MIN	MAX	UNIT
$V_{DD} - V_{SS}$	Supply voltage		20	V
V_{DD}		–0.5	20	V
V_{SS}		–20	0.5	V
I_{SEL} or I_{EN}	Logic control input pin current ($\overline{EN}$, Ax, SELx)	–30	30	mA
V_S or V_D	Source or drain voltage (Sx, D)	V_{SS}–0.5	V_{DD}+0.5	V
I_S or $I_{D\ (CONT)}$	Source or drain continuous current (Sx, D)	–20	20	mA
T_J	Junction temperature		150	°C
T_{stg}	Storage temperature	–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Rating* 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 Condition*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltages are with respect to ground, unless otherwise specified.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	±500	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	±1500	

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

5.3 Recommended Operating Conditions

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

		MIN	NOM	MAX	UNIT
$V_{DD} - V_{SS}$ (1)	Power supply voltage differential	3		18	V
V_{DD}	Positive power supply voltage	3		18	V
V_S or V_D	Signal path input/output voltage (source or drain pin) (Sx, D)	V_{SS}		V_{DD}	V
V_{SEL} or V_{EN}	Address or enable pin voltage	0		V_{DD}	V
I_S or $I_{D\ (CONT)}$	Source or drain continuous current (Sx, D)	–10		10	mA
T_A	Ambient temperature	–55		125	°C

(1) V_{DD} and V_{SS} can be any value as long as $3V \le (V_{DD} - V_{SS}) \le 24V$, and the minimum V_{DD} is met.

Copyright © 2024 Texas Instruments Incorporated

5.4 Thermal Information

THERMAL METRIC[1]		CD406x				UNIT
		N (PDIP)	D (SOIC)	NS (SO)	PW (TSSOP)	
		14 PINS	14 PINS	14 PINS	14 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	93.7	109.7	112.4	101.8	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	72.5	69.4	70.4	44.3	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	68.0	67.9	76.4	68.2	°C/W
Ψ_{JT}	Junction-to-top characterization parameter	50.3	25.8	28.9	3.2	°C/W
Ψ_{JB}	Junction-to-board characterization parameter	67.3	67.1	75.4	67.6	°C/W

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

5.5 Electrical Characteristics

Over operating free-air temperature range, V_{SUPPLY} = ±5V, and R_L = 100 Ω, (unless otherwise noted)[1]

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
SIGNAL INPUTS (V_{IS}) AND OUTPUTS (V_{OS})								
V_{OS}	Switch output voltage		V_{DD} = 5V V_{is} = 0V				0.4	V
			V_{DD} = 5V V_{is} = 5V		4.6			V
			V_{DD} = 10V V_{is} = 0V				0.5	V
			V_{DD} = 10V V_{is} = 10V		9.5			V
			V_{DD} = 15V V_{is} = 0V				1.5	V
			V_{DD} = 15V V_{is} = 15V		13.5			V
ΔR_{ON}	On-state resistance difference between any two switches		R_L = 10kΩ, V_C = VDD	V_{DD} = 5V		15		Ω
	On-state resistance difference between any two switches	On-state resistance difference between any two switches		V_{DD} = 10V		10		
	On-state resistance difference between any two switches	On-state resistance difference between any two switches		V_{DD} = 15V		5		
V_{IHC}	Control input, high voltage		See Figure 7	V_{DD} = 5V	3.5			V
				V_{DD} = 10V	7			V
				V_{DD} = 15V	11			V
	Maximum control input repetition rate		V_{IN} = V_{DD}, C_L = 50pF, R_L = 1kΩ V_C = 10V (square wave centered on 5V), t_r , t_f = 20ns, V_{os} = 1/2V_{os} at 1kHz	V_{DD} = 5V		6		MHz
				V_{DD} = 10V		9		
				V_{DD} = 15V		9.5		

Copyright © 2024 Texas Instruments Incorporated

5.5 Electrical Characteristics (continued)

Over operating free-air temperature range, V_{SUPPLY} = ±5V, and R_L = 100 Ω, (unless otherwise noted)(1)

PARAMETER		TEST CONDITIONS				MIN	TYP	MAX	UNIT
C_{IN}	Input Capacitance						5	7.5	pF
I_{IS}	Switch input current	V_{DD} = 5V V_{is} = 0V	T_A = –55°C					0.64	mA
			T_A = –40°C					0.61	
			T_A = 25°C				0.51		
			T_A = 85°C					0.42	
			T_A = 125°C					0.36	
		V_{DD} = 5V V_{is} = 5V	T_A = –55°C					-0.64	mA
			T_A = –40°C					-0.61	
			T_A = 25°C				-0.51		
			T_A = 85°C					-0.42	
			T_A = 125°C					-0.36	
		V_{DD} = 10V V_{is} = 0V	T_A = –55°C					1.6	mA
			T_A = –40°C					1.5	
			T_A = 25°C				1.3		
			T_A = 85°C					1.1	
			T_A = 125°C					0.9	
		V_{DD} = 10V V_{is} = 10V	T_A = –55°C					-1.6	mA
			T_A = –40°C					-1.5	
			T_A = 25°C				-1.3		
			T_A = 85°C					-1.1	
			T_A = 125°C					-0.9	
		V_{DD} = 15V V_{is} = 0V	T_A = –55°C					4.2	mA
			T_A = –40°C					4	
			T_A = 25°C				3.4		
			T_A = 85°C					2.8	
			T_A = 125°C					2.4	
		V_{DD} = 15V V_{is} = 15V	T_A = –55°C					-4.2	mA
			T_A = –40°C					-4	
			T_A = 25°C				-3.4		
			T_A = 85°C					-2.8	
			T_A = 125°C					-2.4	

Copyright © 2024 Texas Instruments Incorporated

5.5 Electrical Characteristics (continued)

Over operating free-air temperature range, V_{SUPPLY} = ±5V, and R_L = 100 Ω, (unless otherwise noted)(1)

PARAMETER		TEST CONDITIONS				MIN	TYP	MAX	UNIT
I_{DD}	Quiescent Device Current All switches OFF	V_{is} = 0 to 5V V_{DD} = 5V	T_A = –55°C					5	µA
			T_A = –40°C					5	
			T_A = 25°C				4	6	
			T_A = 85°C					7	
			T_A = 125°C					7.5	
		V_{is} = 0 to 10V V_{DD} = 10V	T_A = –55°C					6	
			T_A = –40°C					6	
			T_A = 25°C				5	7	
			T_A = 85°C					8	
			T_A = 125°C					9	
		V_{is} = 0 to 15V V_{DD} = 15V	T_A = –55°C					7	
			T_A = –40°C					7.5	
			T_A = 25°C				5.5	8	
			T_A = 85°C					9	
			T_A = 125°C					10	
		V_{is} = 0 to 20V V_{DD} = 20V	T_A = –55°C					8.5	
			T_A = –40°C					8.5	
			T_A = 25°C				6.5	9	
			T_A = 85°C					10	
			T_A = 125°C					11	
r_{ON}	ON Resistance r_{ON} Max	to $(V_{DD}+V_{SS})/2$, V_C = V_{DD}, R_L = 10kΩ returned V_{is} = V_{SS} to V_{DD}	V_{DD} = 5V	T_A = –55°C				800	Ω
				T_A = –40°C				850	
				T_A = 25°C			470	1050	
				T_A = 85°C				1200	
				T_A = 125°C				1300	
			V_{DD} = 10V	T_A = –55°C				310	
				T_A = –40°C				330	
				T_A = 25°C			180	400	
				T_A = 85°C				500	
				T_A = 125°C				500	
			V_{DD} = 15V	T_A = –55°C				200	
				T_A = –40°C				210	
				T_A = 25°C			125	240	
				T_A = 85°C				300	
				T_A = 125°C				320	

Copyright © 2024 Texas Instruments Incorporated

5.5 Electrical Characteristics (continued)

Over operating free-air temperature range, V_{SUPPLY} = ±5V, and R_L = 100 Ω, (unless otherwise noted)(1)

PARAMETER			TEST CONDITIONS				MIN	TYP	MAX	UNIT
V_{ILC}	Control input, low voltage (max)		$\|I_{is}\|$ < 10 µA, V_{is} = V_{SS}, V_{OS} = V_{DD}, and V_{is} = V_{DD}, V_{OS} = V_{SS}	V_{DD} = 5V	T_A = –55°C			1		V
					T_A = –40°C			1		
					T_A = 25°C			1		
					T_A = 85°C			1		
					T_A = 125°C			1		
				V_{DD} = 10V	T_A = –55°C			1		
					T_A = –40°C			1		
					T_A = 25°C			1		
					T_A = 85°C			1		
					T_A = 125°C			1		
				V_{DD} = 15V	T_A = –55°C			1		
					T_A = –40°C			1		
					T_A = 25°C			1		
					T_A = 85°C			1		
					T_A = 125°C			1		
I_{IN}	Input current (max)		V_{is} ≤ V_{DD}, V_{DD} – V_{SS} = 18V, V_{CC} ≤ V_{DD} – V_{SS} V_{DD} = 18V	T_A = –55°C			-0.8		0.8	µA
				T_A = –40°C			-0.8		0.8	
				T_A = 25°C			-0.7	±0.2	0.7	
	Input current (max)	Input current (max)		T_A = 85°C			-0.6		0.6	
	Input current (max)	Input current (max)		T_A = 125°C			-0.55		0.55	

(1) Peak-to-Peak voltage symmetrical about (V_{DD} – V_{EE}) / 2.

5.6 Switching Characteristics

T_A = 25°C

PARAMETER	FROM	TO	TEST CONDITIONS	V_{CC}	MIN	TYP	MAX	UNIT
t_{pd}	Signal input	Signal output	V_{IN} = V_{DD}, t_r, t_f = 20ns, C_L = 50pF, R_L = 1kΩ	5V		20	40	ns
				10V		10	20	
				15V		7	15	
t_{plh}	Signal input	Signal output	V_{IN} = V_{DD}, t_r, t_f = 20ns, C_L = 50pF, R_L = 1kΩ	5V		35	70	ns
				10V		20	40	
				15V		15	30	
t_{phl}	Signal input	Signal output	V_{IN} = V_{DD}, t_r, t_f = 20ns, C_L = 50pF, R_L = 1kΩ	5V		35	70	ns
				10V		20	40	
				15V		15	30	

Copyright © 2024 Texas Instruments Incorporated

5.7 Typical Characteristics

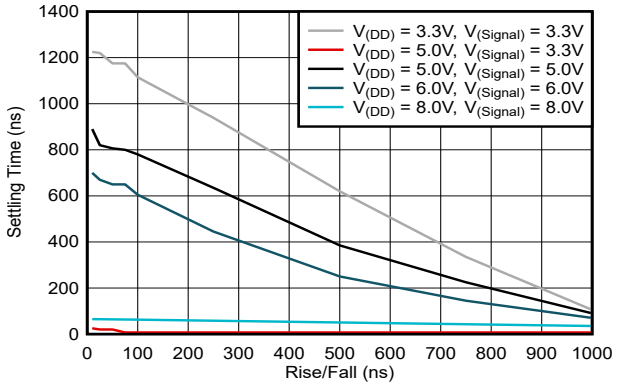


Figure 5-1. System Settling Time vs Signal Rise/ Fall Time

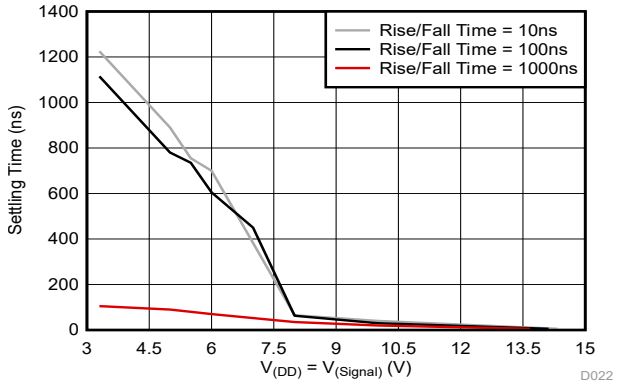


Figure 5-2. System Settling Time vs Signal Voltage

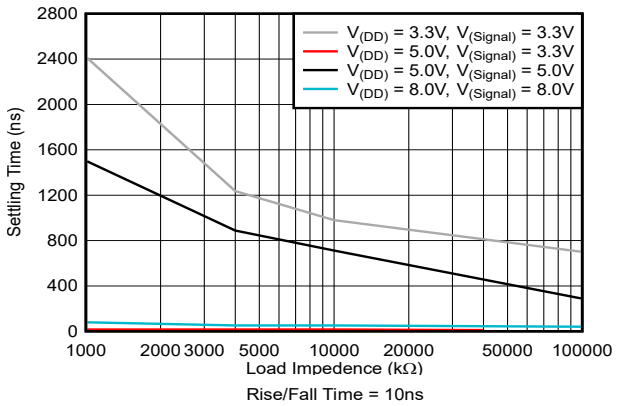


Figure 5-3. System Settling Time vs Signal Voltage

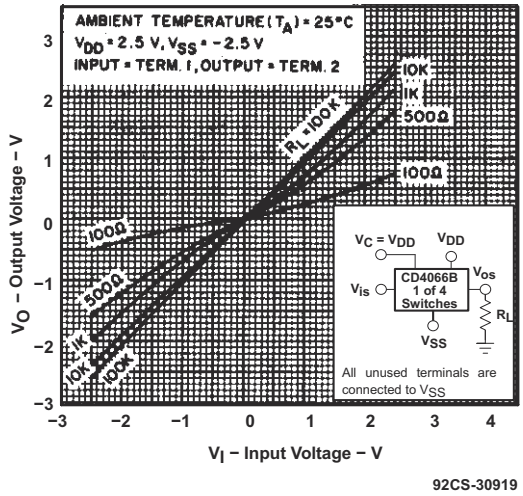


Figure 5-4. Typical ON Characteristics for 1 of 4 Channels

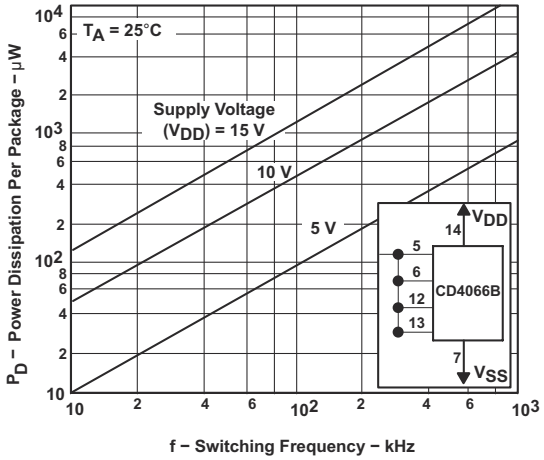
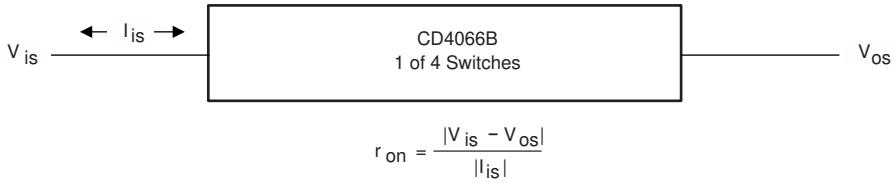


Figure 5-5. Power Dissipation per Package vs Switching Frequency

Copyright © 2024 Texas Instruments Incorporated

6 Parameter Measurement Information



Copyright © 2016, Texas Instructions Incorporated

Figure 6-1. Determination of r_{on} as a Test Condition for Control-Input High-Voltage (V_{IHC}) Specification

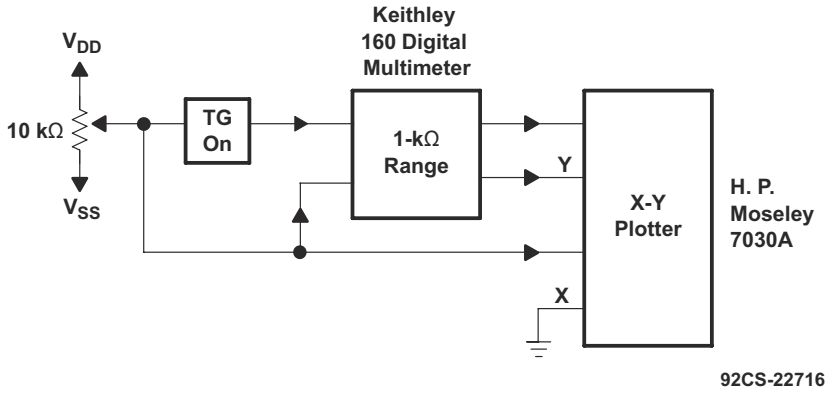
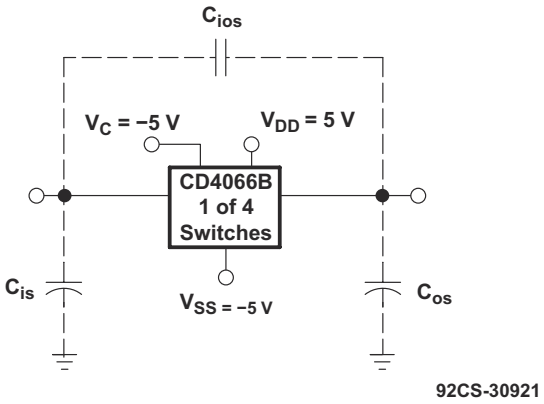


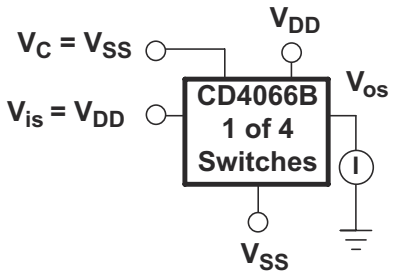
Figure 6-2. Channel On-State Resistance Measurement Circuit



Measured on Boonton capacitance bridge, model 75a (1 MHz);
test-fixture capacitance nulled out.

Figure 6-3. Typical On Characteristics for One of Four Channels

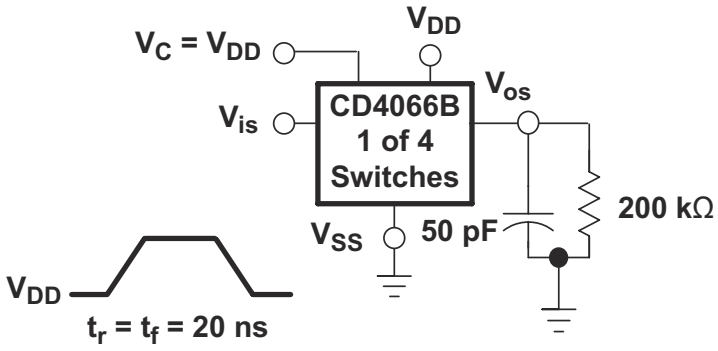
Copyright © 2024 Texas Instruments Incorporated



92CS-30922

All unused terminals are connected to V_{SS}.

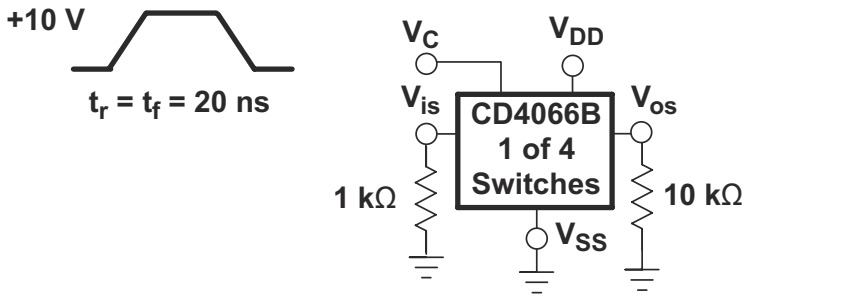
Figure 6-4. Off-Switch Input or Output Leakage



92CS-30923

All unused terminals are connected to V_{SS}.

Figure 6-5. Propagation Delay Time Signal Input (V_{is}) to Signal Output (V_{os})

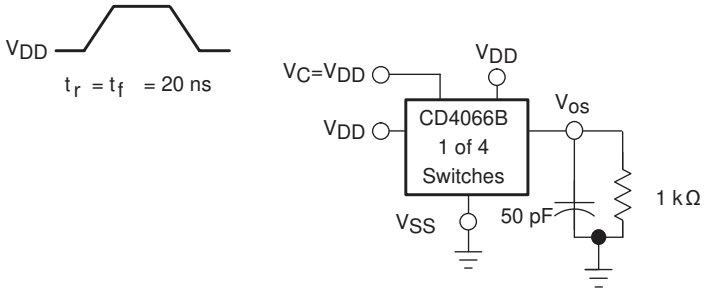


92CS-30924

All unused terminals are connected to V_{SS}.

Figure 6-6. Crosstalk-Control Input to Signal Output

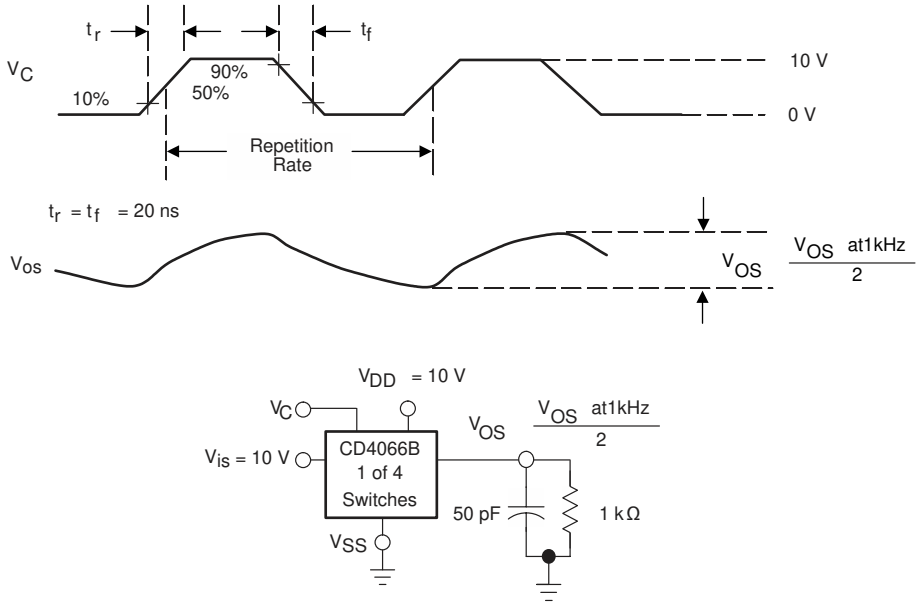
Copyright © 2024 Texas Instruments Incorporated



Copyright © 2016, Texas Instruments Incorporated

All unused pins are connected to V_{SS}.
Delay is measured at V_{os} level of +10% from ground (turn-on) or on-state output level (turn-off).

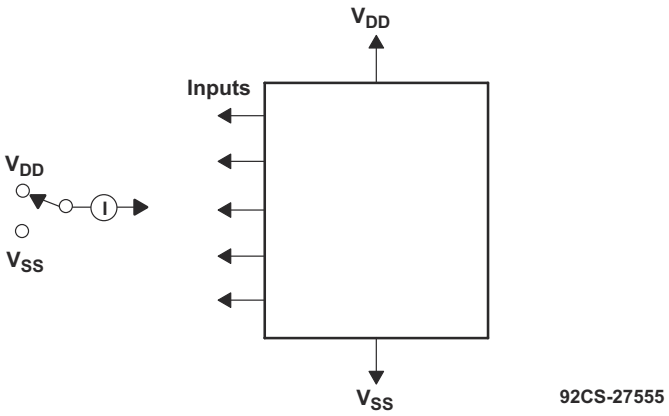
Figure 6-7. Propagation Delay, t_{PLH}, t_{PHL} Control-Signal Output



Copyright © 2016, Texas Instruments Incorporated

All unused pins are connected to V_{SS}.

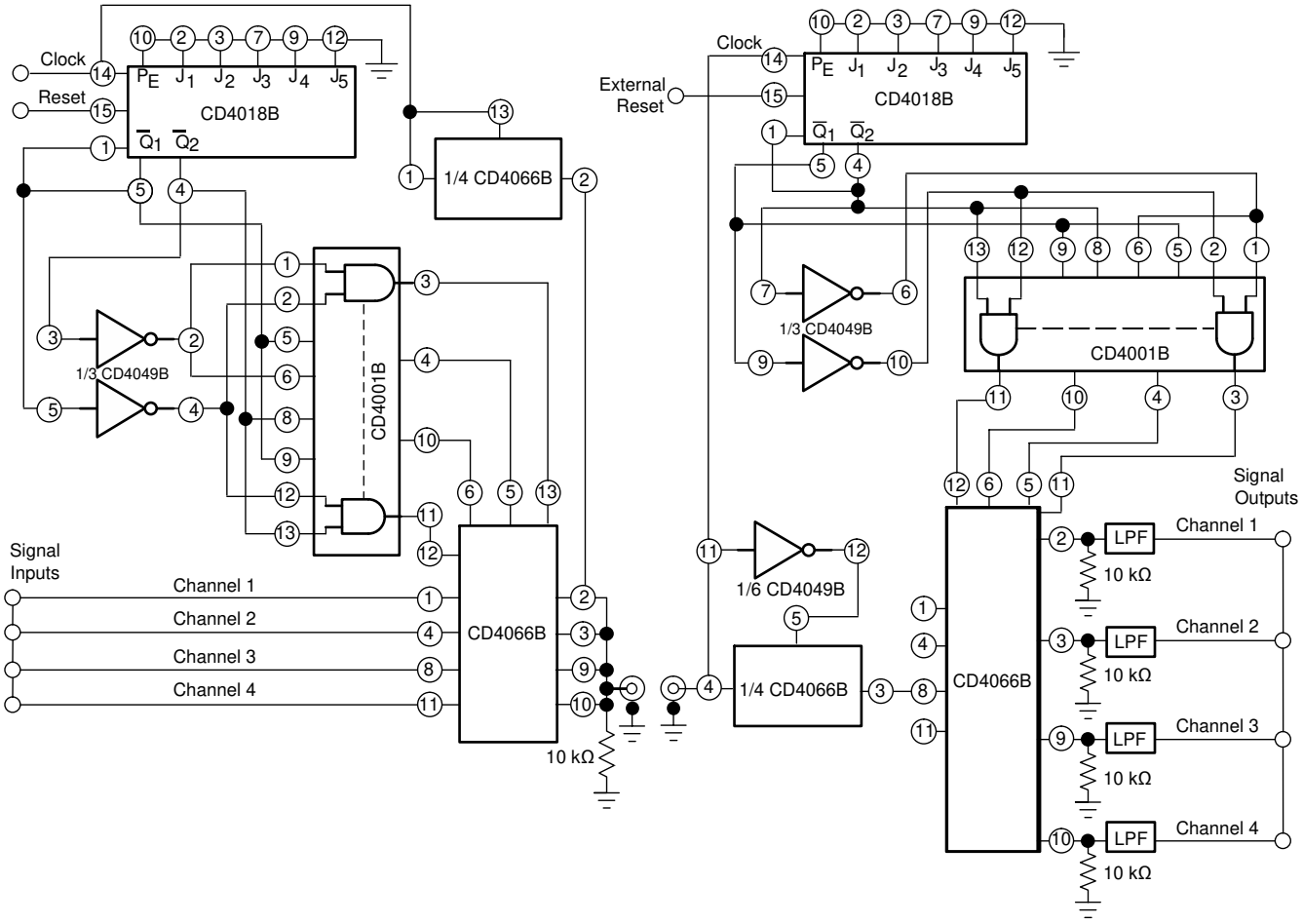
Figure 6-8. Maximum Allowable Control-Input Repetition Rate



Measure inputs sequentially to both V_{DD} and V_{SS}. Connect all unused inputs to either V_{DD} or V_{SS}. Measure control inputs only.

Figure 6-9. Input Leakage-Current Test Circuit

Copyright © 2024 Texas Instruments Incorporated



Copyright © 2016, Texas Instruments Incorporated

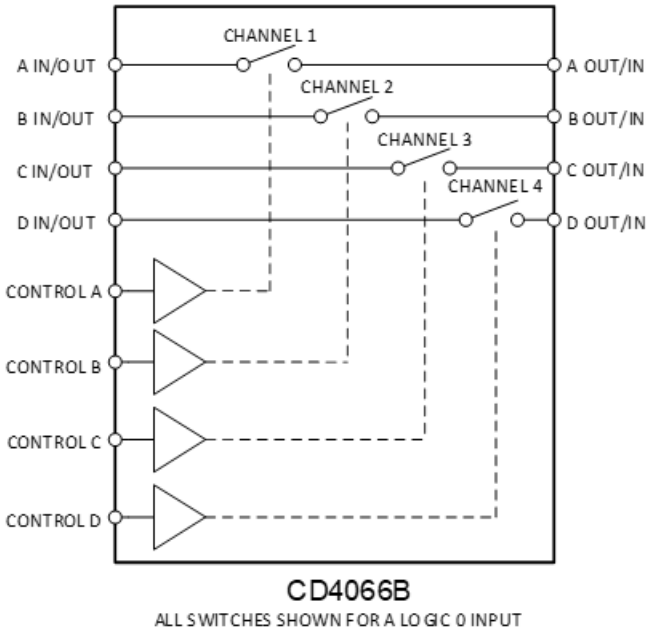
Figure 6-10. Four-Channel PAM Multiplex System Diagram

7 Detailed Description

7.1 Overview

CD4066B has four independent digitally controlled analog switches with a bias voltage of V_{SS} to allow for different voltage levels to be used for low output. Both the p and n devices in a given switch are biased on or off simultaneously by the control signal. As shown in Figure 7-1, the well of the n-channel device on each switch is tied to either the input (when the switch is on) or to V_{SS} (when the switch is off). Thus, when the control of the device is low, the output of the switch goes to V_{SS} and when the control is high the output of the device goes to V_{DD}.

7.2 Functional Block Diagram



A. All control inputs are protected by the CMOS protection network.
B. All p substrates are connected to V_{DD}.
C. Normal operation control-line biasing: switch on (logic 1), $V_C = V_{DD}$; switch off (logic 0), $V_C = V_{SS}$.
D. Signal-level range: $V_{SS} \le V_{is} \le V_{DD}$.

Figure 7-1. Schematic Diagram of One-of-Four Identical Switches and Associated Control Circuitry

7.3 Feature Description

Each switch has different control pins, which allows for more options for the outputs. Bias Voltage allows the device to output a voltage other than 0V when the device control is low. The CD4066B has a large absolute maximum voltage for V_{DD} of 20V.

Copyright © 2024 Texas Instruments Incorporated

7.4 Device Functional Modes

Table 7-1 lists the functions of this device.

Table 7-1. Function Table

INPUTS		OUTPUT
SIG IN/OUT	CONTROL	SIG OUT/IN
H	H	H
L	H	L
X	L	Hi-Z

Copyright © 2024 Texas Instruments Incorporated

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

In applications that employ separate power sources to drive V_{DD} and the signal inputs, the V_{DD} current capability should exceed V_{DD}/R_L (R_L = effective external load of the four CD4066B device bilateral switches). This provision avoids any permanent current flow or clamp action on the V_{DD} supply when power is applied or removed from the CD4066B device.

In certain applications, the external load-resistor current can include both V_{DD} and signal-line components. To avoid drawing V_{DD} current when switch current flows into pins 1, 4, 8, or 11, the voltage drop across the bidirectional switch must not exceed 0.8V (calculated from r_{on} values shown).

No V_{DD} current flows through R_L if the switch current flows into pins 2, 3, 9, or 10.

8.2 Typical Application

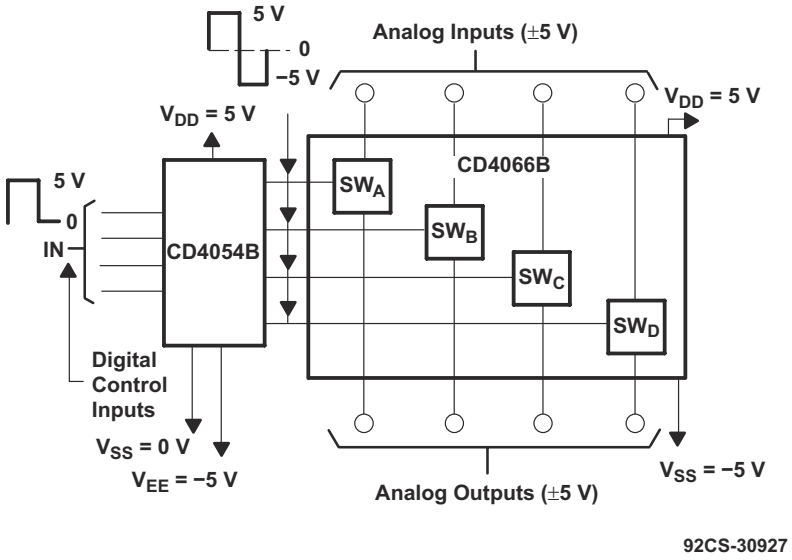


Figure 8-1. Bidirectional Signal Transmission Through Digital Control Logic

8.2.1 Design Requirements

This device uses CMOS technology and has balanced output drive. Avoid bus contention because it can drive currents in excess of maximum limits. The high drive also creates fast edges into light loads, so consider routing and load conditions to prevent ringing.

8.2.2 Detailed Design Procedure

1. Recommended input conditions:
   - For rise time and fall time specifications, see Δt/Δv in *Recommended Operating Conditions* .
   - For specified high and low levels, see V_{IH} and V_{IL} in *Recommended Operating Conditions* .
2. Recommended output conditions:
   - Load currents should not exceed ±10mA.

Copyright © 2024 Texas Instruments Incorporated

8.2.3 Application Curve

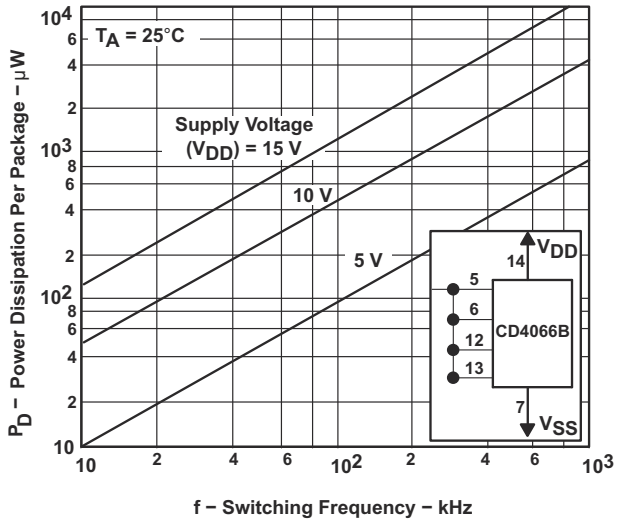


Figure 8-2. Power Dissipation vs. Switching Frequency

8.3 Power Supply Recommendations

The power supply can be any voltage between the MIN and MAX supply voltage rating located in *Recommended Operating Conditions* .

Each VCC pin should have a good bypass capacitor to prevent power disturbance. For devices with a single supply, 0.1µF is recommended; if there are multiple VCC pins, then 0.01µF or 0.022µF is recommended for each power pin. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1µF and a 1µF are commonly used in parallel. The bypass capacitor should be installed as close to the power pin as possible for best results.

8.4 Layout

8.4.1 Layout Guidelines

When using multiple bit logic devices inputs must never float.

In many cases, functions or parts of functions of digital logic devices 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. All unused inputs of digital logic devices must be connected to a high or low bias to prevent them from floating. The logic level that should be applied to any particular unused input depends on the function of the device. Generally they are tied to GND or VCC, whichever makes more sense or is more convenient. It is generally acceptable to float outputs, unless the part is a transceiver. If the transceiver has an output enable pin, it disables the output section of the part when asserted. This does not disable the input section of the I/Os, so they cannot float when disabled.

8.4.2 Layout Example

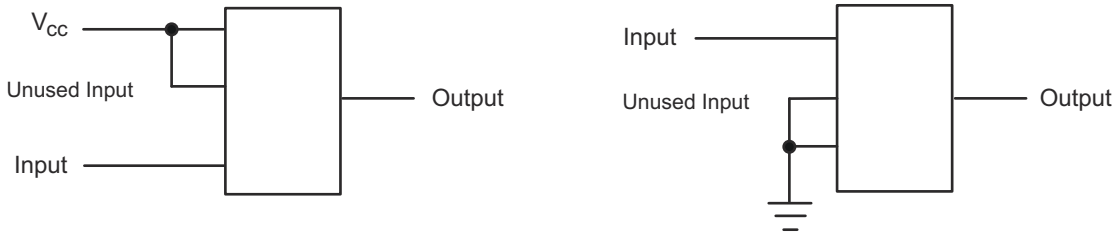


Figure 8-3. Diagram for Unused Inputs

9 Device and Documentation Support

9.1 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.

9.2 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.

Linked content is 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.

9.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

9.4 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.

9.5 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.

Changes from Revision I (May 2024) to Revision J (August 2024)	Page
• Added Settling Time plots	9

Changes from Revision H (January 2020) to Revision I (May 2024)	Page
• Changed *Package Information* table to include package leads	1
• Changed the numbering format for tables, figures, and cross-references throughout the document	1
• Deleted the *J (CDIP, 14)* package from the data sheet	1
• Changed max and typ IDD for lower supply voltages	5
• Changed VIL from 2V to 1V acorss supply	5

Changes from Revision G (June 2017) to Revision H (January 2020)	Page
• Added Junction Temperature details to the *Absolute Maximum Ratings* table	4

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.

Copyright © 2024 Texas Instruments Incorporated

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)
CD4066BE	Active	Production	PDIP (N) | 14	25 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4066BE
CD4066BE.A	Active	Production	PDIP (N) | 14	25 | TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4066BE
CD4066BF	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4066BF
CD4066BF.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4066BF
CD4066BF3A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4066BF3A
CD4066BF3A.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	CD4066BF3A
CD4066BM	Obsolete	Production	SOIC (D) | 14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
CD4066BM96	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4066BM
CD4066BM96.A	Active	Production	SOIC (D) | 14	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4066BM
CD4066BM96G4	Obsolete	Production	SOIC (D) | 14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
CD4066BMT	Obsolete	Production	SOIC (D) | 14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
CD4066BNS	Obsolete	Production	SOP (NS) | 14	-	-	Call TI	Call TI	-55 to 125	CD4066B
CD4066BNSR	Active	Production	SOP (NS) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4066B
CD4066BNSR.A	Active	Production	SOP (NS) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CD4066B
CD4066BPW	Obsolete	Production	TSSOP (PW) | 14	-	-	Call TI	Call TI	-55 to 125	CM066B
CD4066BPWR	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM066B
CD4066BPWR.A	Active	Production	TSSOP (PW) | 14	2000 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	CM066B
CD4066BPWRG4	Obsolete	Production	TSSOP (PW) | 14	-	-	Call TI	Call TI	-55 to 125	CM066B
JM38510/05852BCA	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 05852BCA
JM38510/05852BCA.A	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 05852BCA
M38510/05852BCA	Active	Production	CDIP (J) | 14	25 | TUBE	No	SNPB	N/A for Pkg Type	-55 to 125	JM38510/ 05852BCA

(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.

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

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

OTHER QUALIFIED VERSIONS OF CD4066B, CD4066B-MIL :

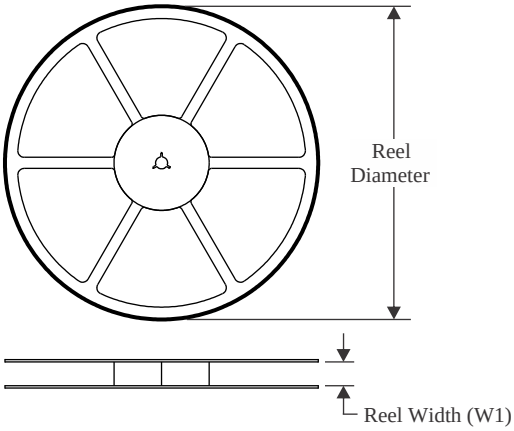
- Catalog : CD4066B
- Automotive : CD4066B-Q1, CD4066B-Q1
- Military : CD4066B-MIL

NOTE: Qualified Version Definitions:

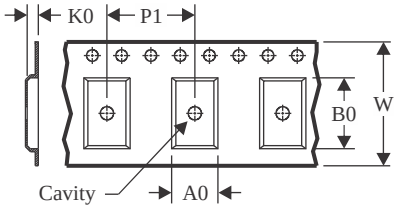
- Catalog - TI's standard catalog product
- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects
- Military - QML certified for Military and Defense Applications

TAPE AND REEL INFORMATION

REEL DIMENSIONS

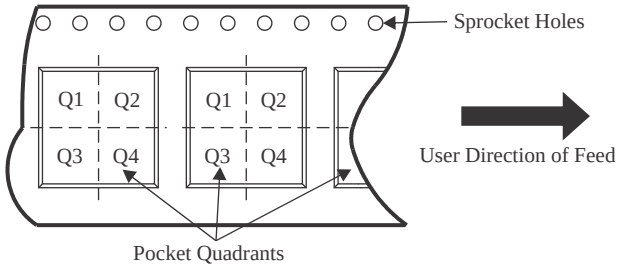


TAPE DIMENSIONS



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

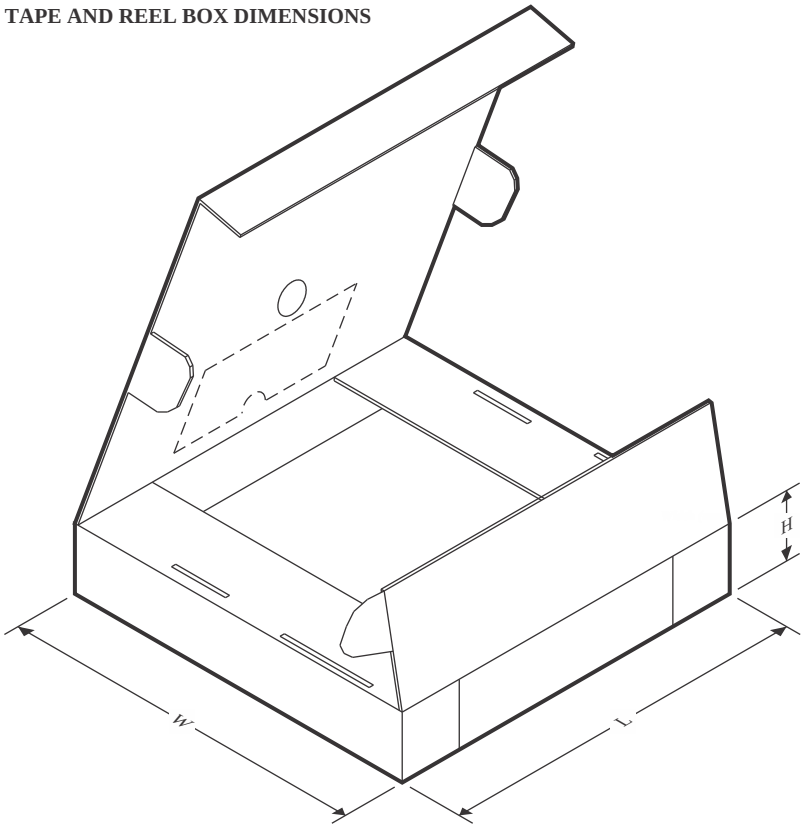
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
CD4066BM96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD4066BM96	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
CD4066BNSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1
CD4066BPWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

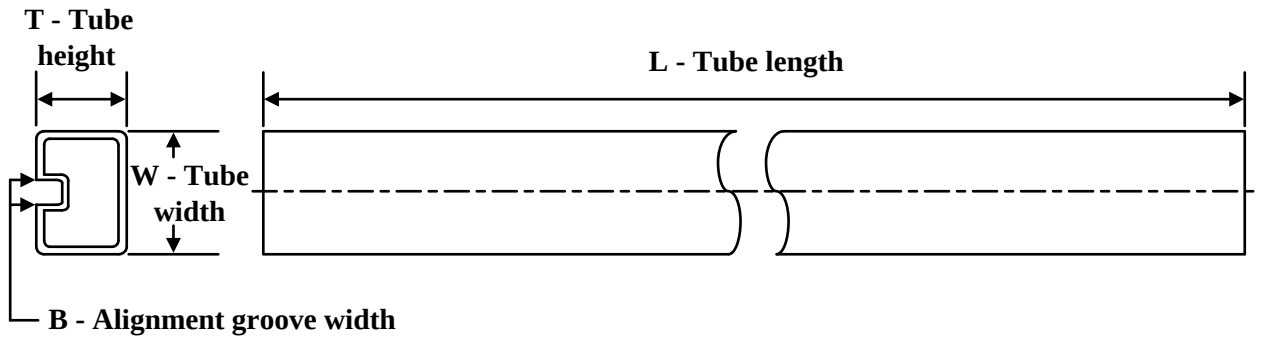
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
CD4066BM96	SOIC	D	14	2500	353.0	353.0	32.0
CD4066BM96	SOIC	D	14	2500	353.0	353.0	32.0
CD4066BNSR	SOP	NS	14	2000	353.0	353.0	32.0
CD4066BPWR	TSSOP	PW	14	2000	353.0	353.0	32.0

TUBE



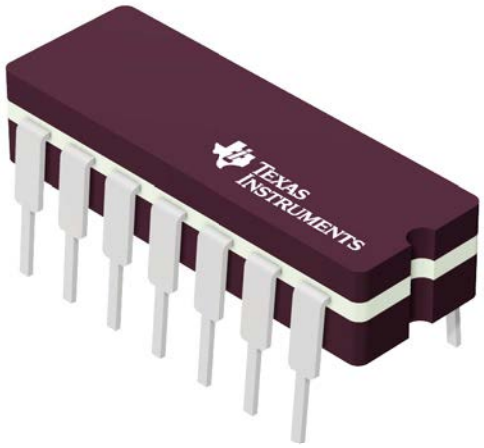
*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
CD4066BE	N	PDIP	14	25	506	13.97	11230	4.32
CD4066BE.A	N	PDIP	14	25	506	13.97	11230	4.32

GENERIC PACKAGE VIEW

J 14 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

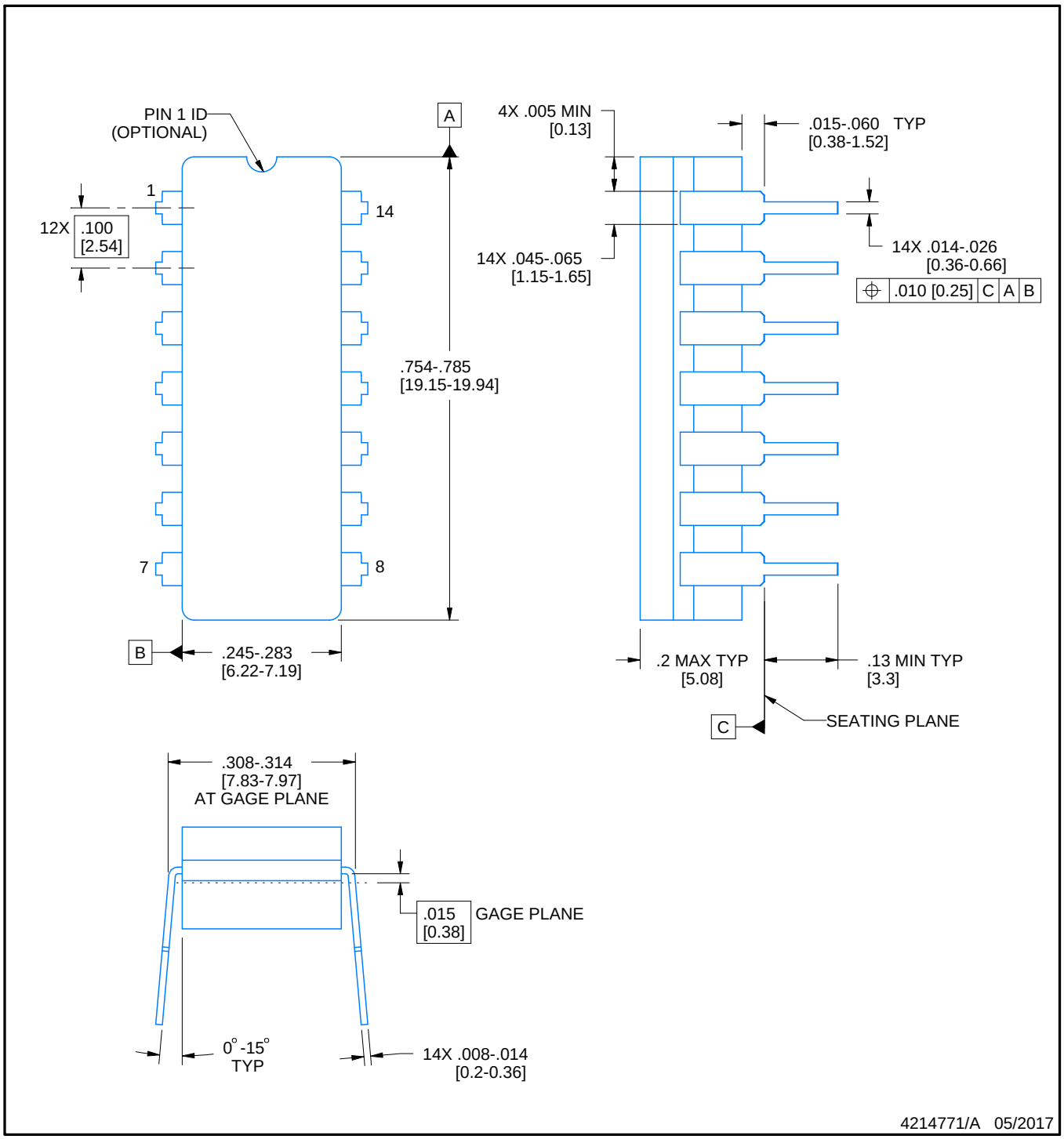


PACKAGE OUTLINE

J0014A

CDIP - 5.08 mm max height

CERAMIC DUAL IN LINE PACKAGE



NOTES:

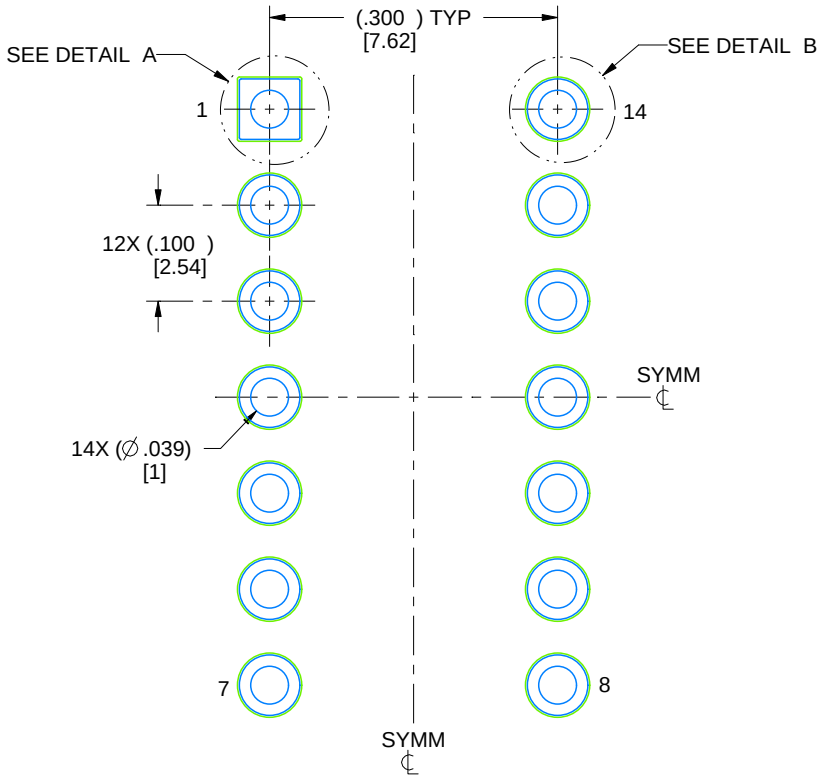
1. All controlling linear dimensions are in inches. Dimensions in brackets are in millimeters. Any dimension in brackets or parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This package is hermitically sealed with 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

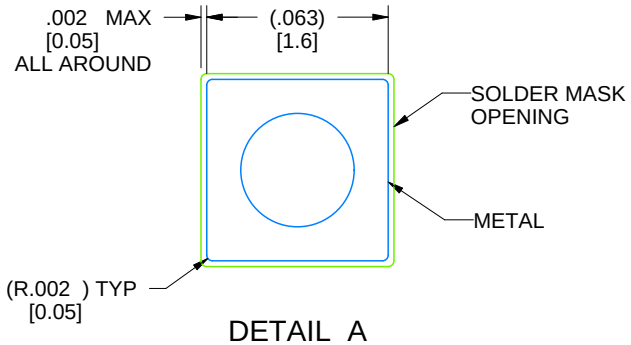
J0014A

CDIP - 5.08 mm max height

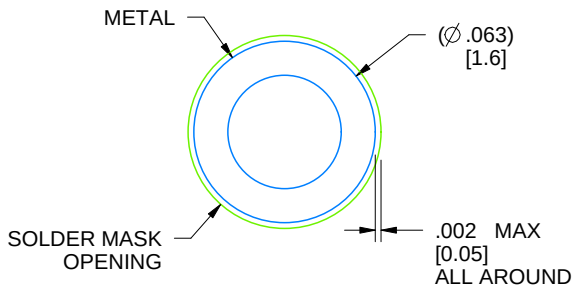
CERAMIC DUAL IN LINE PACKAGE



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



DETAIL A
SCALE: 15X



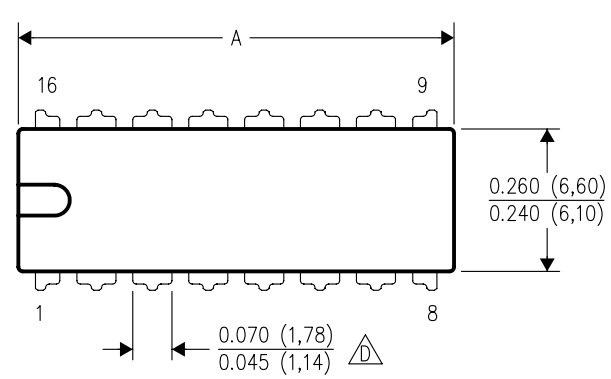
DETAIL B
13X, SCALE: 15X

4214771/A 05/2017

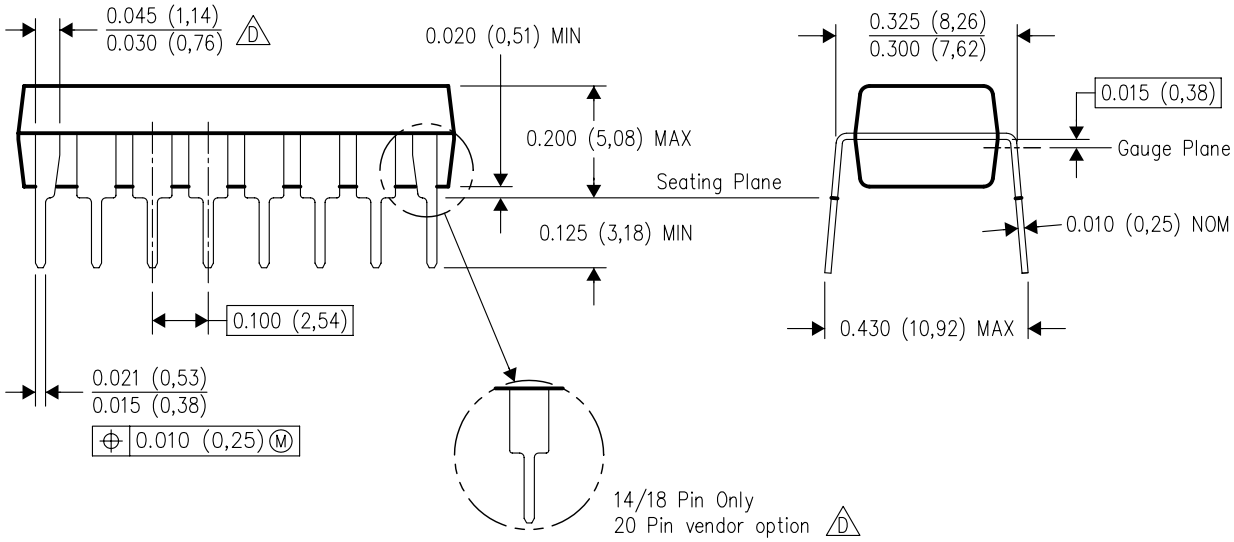
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



4040049/E 12/2002

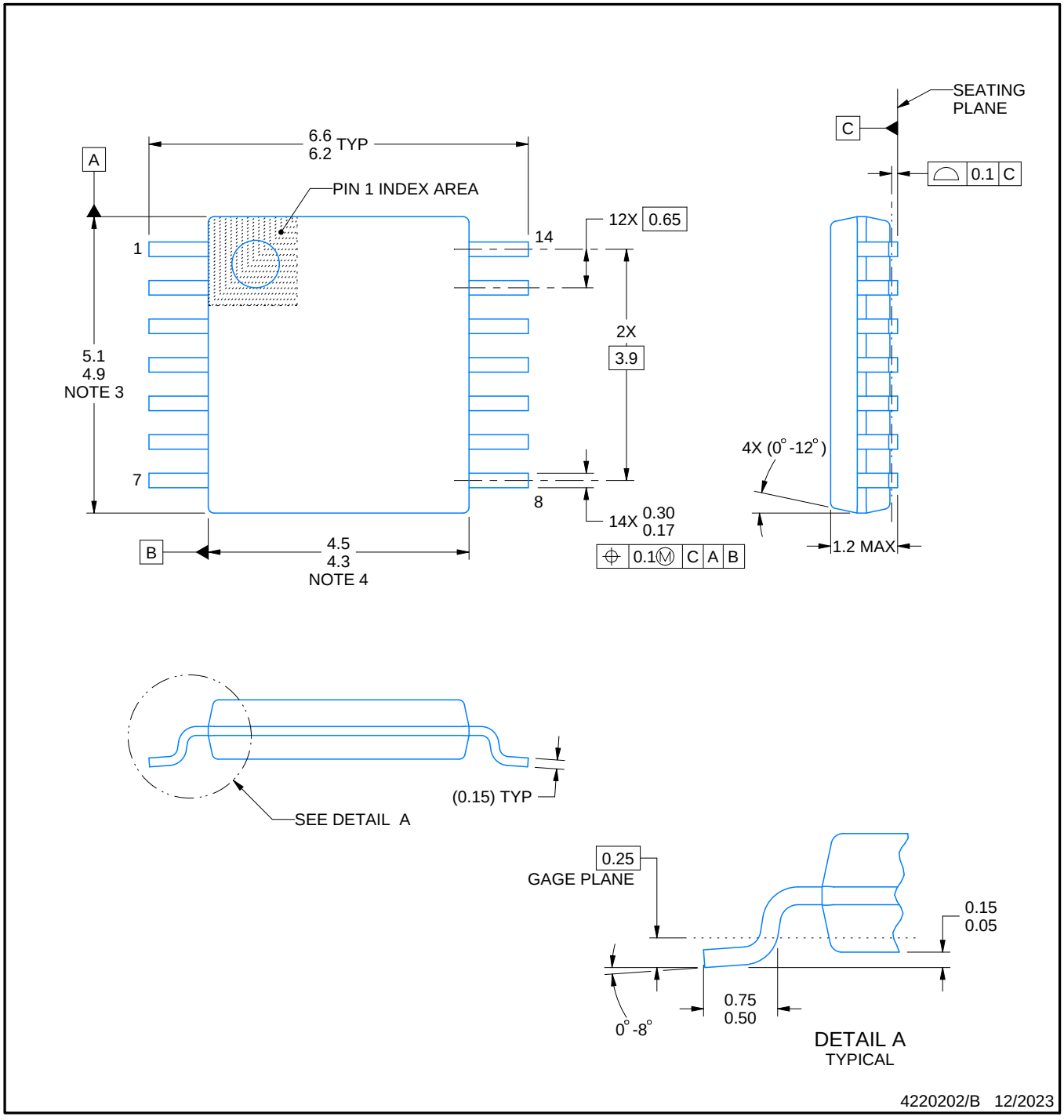
NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

PACKAGE OUTLINE

PW0014A

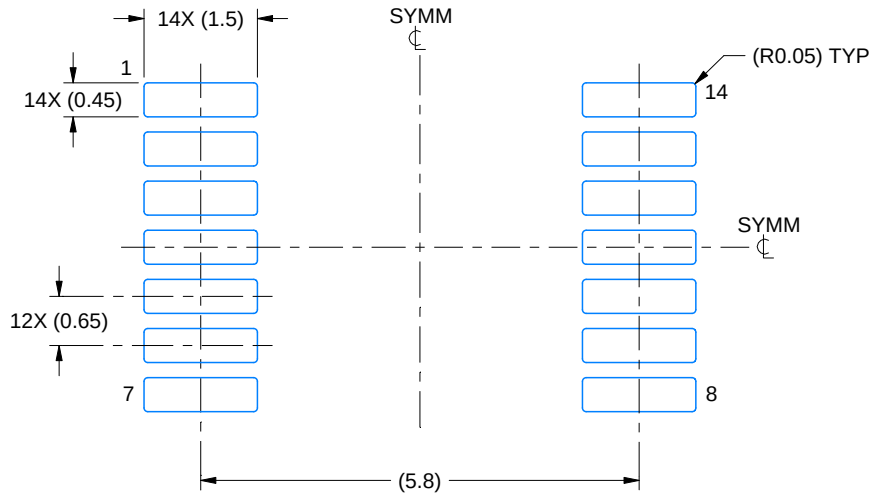
TSSOP - 1.2 mm max height

SMALL OUTLINE PACKAGE

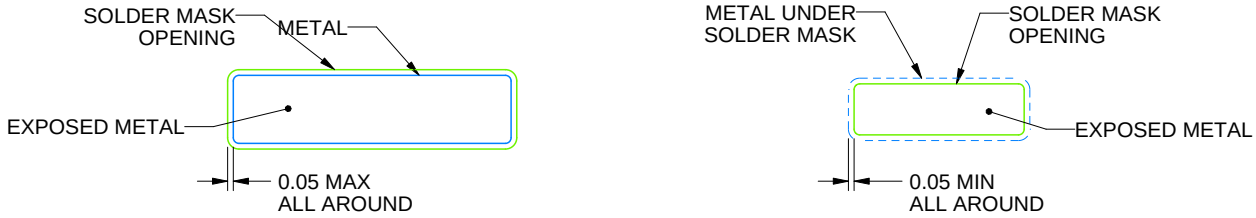


NOTES:

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.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE: 10X

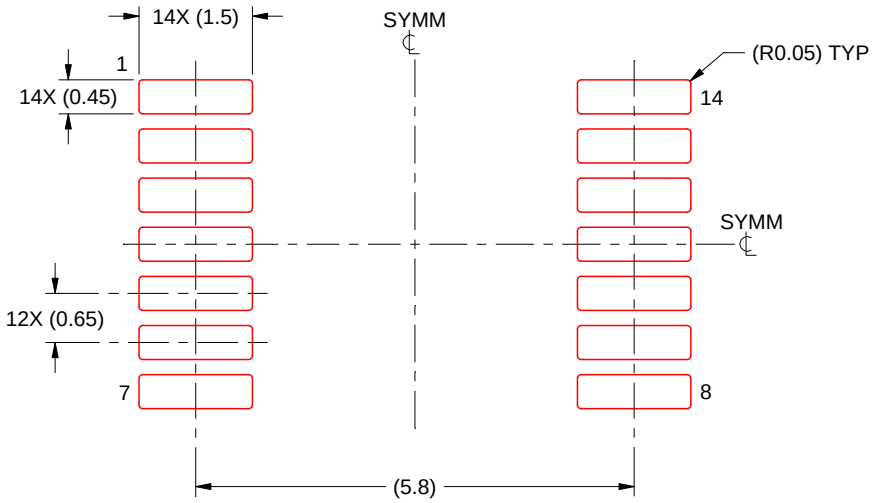


SOLDER MASK DETAILS

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.

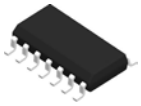


SOLDER PASTE EXAMPLE
BASED ON 0.125 mm THICK STENCIL
SCALE: 10X

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.

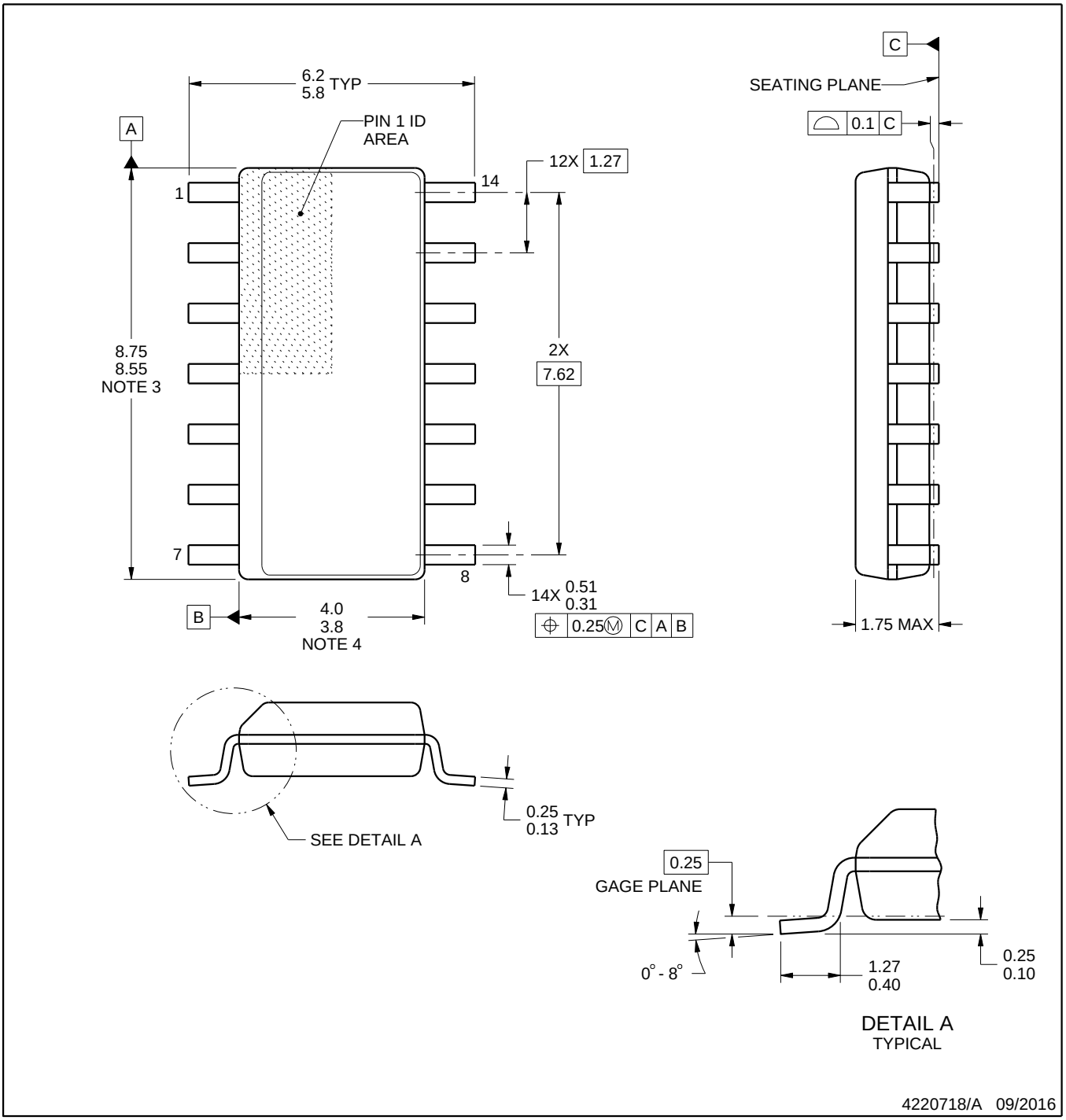


PACKAGE OUTLINE

D0014A

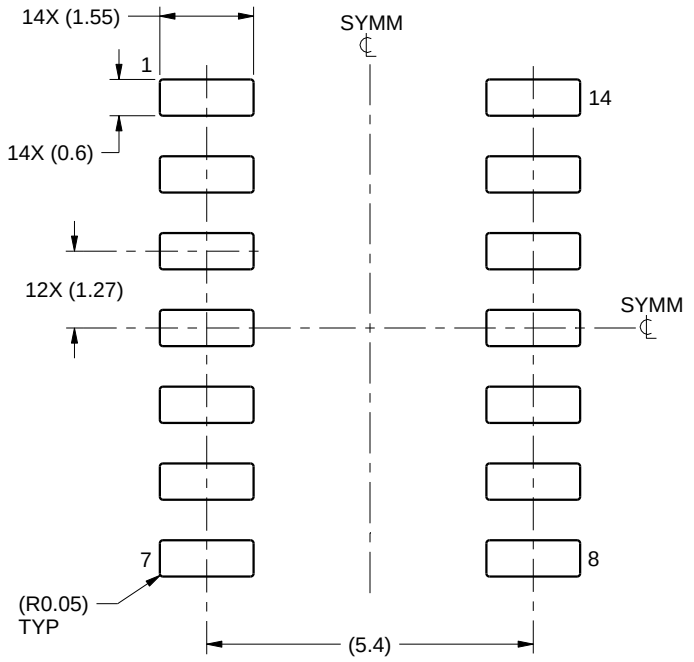
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

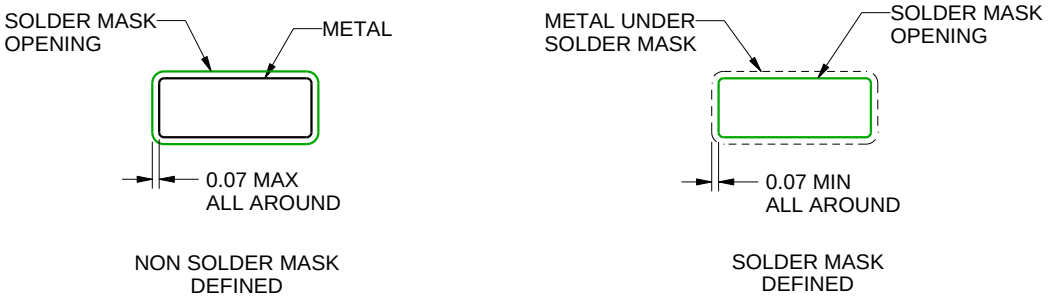


NOTES:

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.



LAND PATTERN EXAMPLE
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

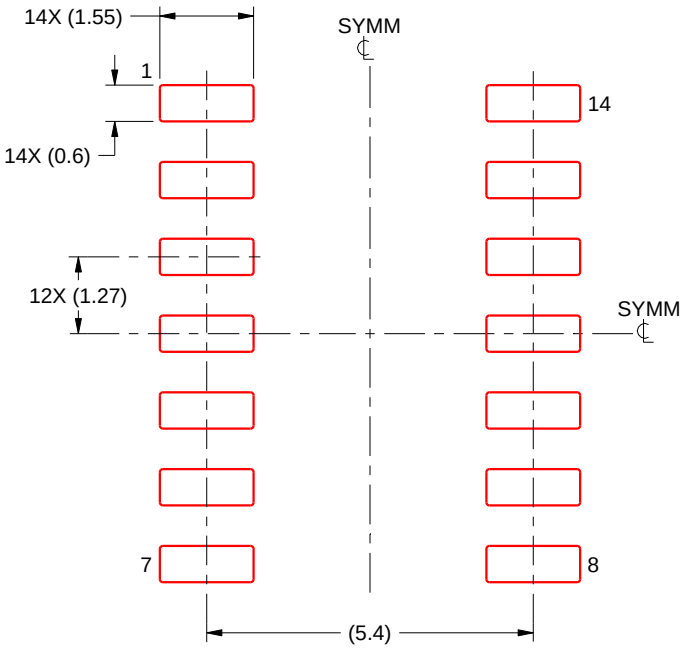
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

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

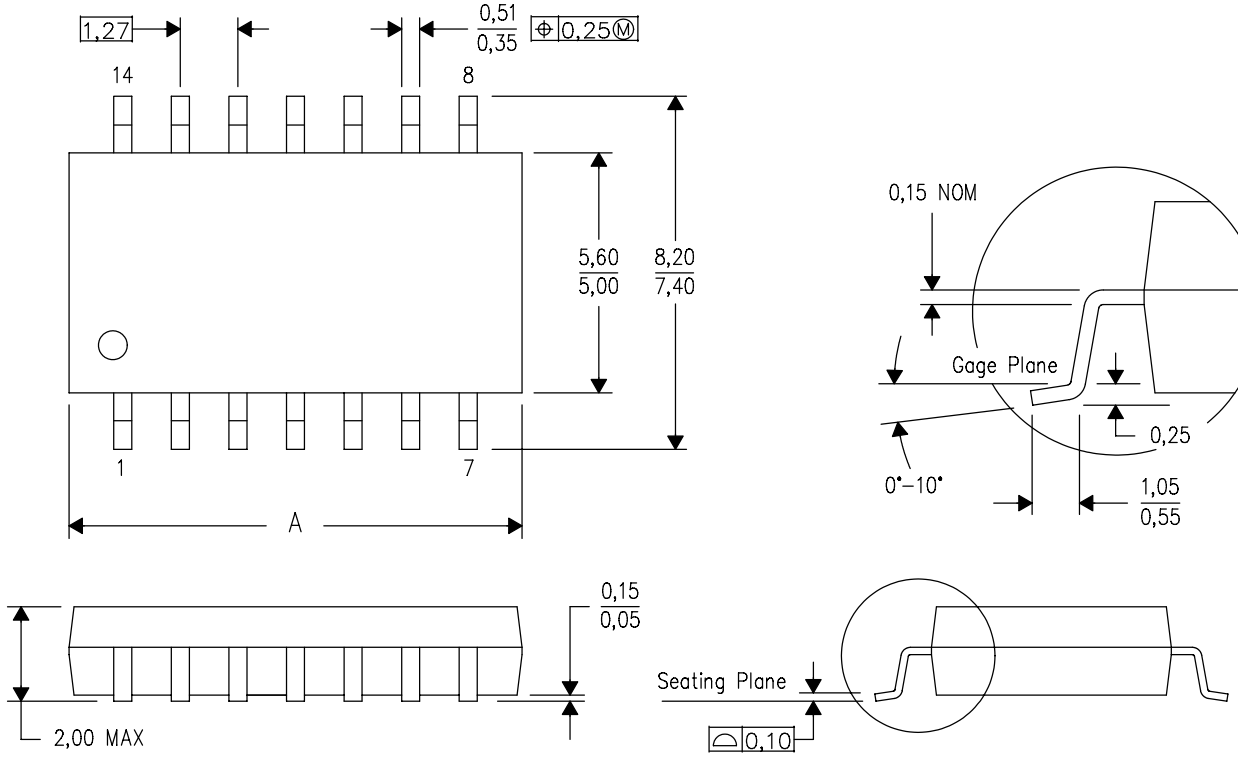
NOTES: (continued)

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



DIM \ PINS **	14	16	20	24
A MAX	10,50	10,50	12,90	15,30
A MIN	9,90	9,90	12,30	14,70

4040062/C 03/03

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.

IMPORTANT NOTICE AND DISCLAIMER

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

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2026, Texas Instruments Incorporated

Last updated 10/2025