

## CD4066B CMOS クワッド双方向スイッチ

### 1 特長

- 15V デジタルまたは  $\pm 7.5V$  ピーク ツー ピーク スイッチング
- 15V 動作で 125 $\Omega$  (標準値) のオン抵抗
- 15V の信号入力範囲にわたってスイッチのオン抵抗の変動が 5 $\Omega$  以下
- ピーク ツー ピーク信号範囲全体にわたってオン抵抗が平坦
- 高いオン / オフ出力電圧比:  
 $f_{is} = 10kHz$ 、 $R_L = 1k\Omega$  で 80dB (標準値)
- 高度な線形性: $f_{is} = 1kHz$ 、 $V_{is} = 5V_{p-p}$ 、 $V_{DD} - V_{SS} \geq 10V$ 、 $R_L = 10k\Omega$  で歪み 0.5% 未満 (標準値)
- オフ状態のスイッチリークが非常に小さいため、非常に低いオフセット電流と高い実効オフ状態抵抗を実現: $V_{DD} - V_{SS} = 10V$ 、 $T_A = 25^\circ C$  で 10pA (標準値)
- 非常に高い制御入力インピーダンス (制御回路を信号回路から絶縁):  
10<sup>12</sup> $\Omega$  (標準値)
- スイッチ間の低いクロストーク: $f_{is} = 8MHz$ 、 $R_L = 1k\Omega$  で -50dB (標準値)
- 制御入力容量と信号出力容量を照合: 出力信号の過渡を低減
- スイッチ オンでの周波数応答 = 40MHz (標準値)
- 20V で静止電流を 100% テスト済み
- 5V、10V、15V のパラメータ定格

### 2 アプリケーション

- アナログ信号のスイッチングと多重化: 信号ゲーティング、変調器、スケルチ制御、復調器、チョッパ、整流スイッチ
- デジタル信号スイッチング / 多重化:
- A/D 変換および D/A 変換
- 周波数、インピーダンス、位相、アナログ信号ゲインのデジタル制御
- [ビル オートメーション](#)

### 3 概要

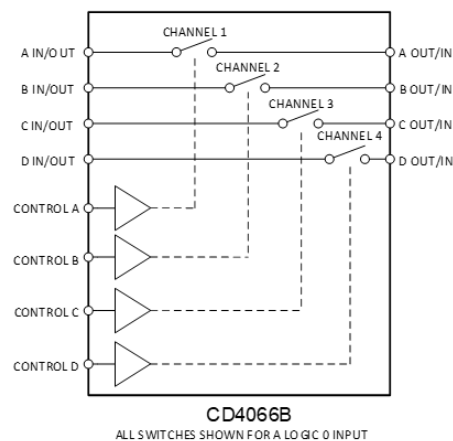
CD4066B デバイスは、アナログまたはデジタル信号の伝送 / 多重化を目的としたクワッド双方向スイッチです。CD4016B デバイスとピン互換ですが、はるかに小さなオン抵抗を示します。また、このオン抵抗は信号入力範囲全体にわたって比較的一定です。

CD4066B デバイスは 4 つの双方向スイッチで構成され、それぞれ独立して制御できます。3V~18V の広い動作電源電圧範囲で、幅広いアプリケーションに使用可能です。シングル チャネル スイッチに対する利点として、ピーク入力信号電圧スイングが電源電圧と完全に等しいことと、オン インピーダンスが入力信号範囲全体にわたってより均一であることが挙げられます。しかし、サンプル アンド ホールドのアプリケーションには、CD4016B デバイスを推奨します。

#### パッケージ情報

部品番号	パッケージ (1)	パッケージ サイズ(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

- 詳細については、[セクション 11](#) を参照してください。
- パッケージ サイズ (長さ × 幅) は公称値であり、該当する場合はピンも含まれます。



### デジタル制御ロジックによる双方向信号伝送



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## 4 Pin Configuration and Functions

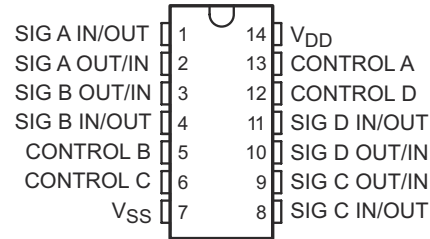


図 4-1. N, J, D, NS, or PW Packages 14-Pin PDIP, CDIP, SOIC, SOP, or TSSOP (Top View)

表 4-1. Pin Functions

PIN		TYPE <sup>(1)</sup>	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 <sub>SS</sub>	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 <sub>DD</sub>	14	—	Power Pin

(1) I = input, O = output

## 5 Specifications

### 5.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)<sup>(1)</sup> <sup>(2)</sup>

		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 <sup>(1)</sup>	±500	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins <sup>(2)</sup>	±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
$V_{DD} - V_{SS}$ <sup>(1)</sup>	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  $3V \leq (V_{DD} - V_{SS}) \leq 24V$ , and the minimum  $V_{DD}$  is met.

## 5.4 Thermal Information

THERMAL METRIC <sup>(1)</sup>		CD406x				UNIT
		N (PDIP)	D (SOIC)	NS (SO)	PW (TSSOP)	
		14 PINS	14 PINS	14 PINS	14 PINS	
R <sub>θJA</sub>	Junction-to-ambient thermal resistance	93.7	109.7	112.4	101.8	°C/W
R <sub>θJC(top)</sub>	Junction-to-case (top) thermal resistance	72.5	69.4	70.4	44.3	°C/W
R <sub>θJB</sub>	Junction-to-board thermal resistance	68.0	67.9	76.4	68.2	°C/W
Ψ <sub>JT</sub>	Junction-to-top characterization parameter	50.3	25.8	28.9	3.2	°C/W
Ψ <sub>JB</sub>	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<sub>SUPPLY</sub> = ±5V, and R<sub>L</sub> = 100 Ω, (unless otherwise noted)<sup>(1)</sup>

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
<b>SIGNAL INPUTS (V<sub>IS</sub>) AND OUTPUTS (V<sub>OS</sub>)</b>							
V <sub>OS</sub>	Switch output voltage	V <sub>DD</sub> = 5V V <sub>is</sub> = 0V				0.4	V
		V <sub>DD</sub> = 5V V <sub>is</sub> = 5V				4.6	V
		V <sub>DD</sub> = 10V V <sub>is</sub> = 0V				0.5	V
		V <sub>DD</sub> = 10V V <sub>is</sub> = 10V				9.5	V
		V <sub>DD</sub> = 15V V <sub>is</sub> = 0V				1.5	V
		V <sub>DD</sub> = 15V V <sub>is</sub> = 15V				13.5	V
Δ R <sub>ON</sub>	On-state resistance difference between any two switches		R <sub>L</sub> = 10kΩ, V <sub>C</sub> = V <sub>DD</sub>	V <sub>DD</sub> = 5V		15	Ω
	On-state resistance difference between any two switches	On-state resistance difference between any two switches		V <sub>DD</sub> = 10V		10	
	On-state resistance difference between any two switches	On-state resistance difference between any two switches		V <sub>DD</sub> = 15V		5	
V <sub>IHC</sub>	Control input, high voltage		See Figure 7	V <sub>DD</sub> = 5V		3.5	V
				V <sub>DD</sub> = 10V		7	V
				V <sub>DD</sub> = 15V		11	V

### 5.5 Electrical Characteristics (続き)

Over operating free-air temperature range,  $V_{SUPPLY} = \pm 5V$ , and  $R_L = 100 \Omega$ , (unless otherwise noted)<sup>(1)</sup>

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNI T	
	Maximum control input repetition rate	$V_{IN} = V_{DD}$ , $C_L = 50pF$ , $R_L = 1k\Omega$ $V_C = 10V$ (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			
$C_{IN}$	Input Capacitance				5	7.5	pF		
$I_{IS}$	Switch input current	$V_{DD} = 5V$ $V_{is} = 0V$	$T_A = -55^\circ C$				0.64	mA	
			$T_A = -40^\circ C$				0.61		
			$T_A = 25^\circ C$			0.51			
			$T_A = 85^\circ C$				0.42		
			$T_A = 125^\circ C$				0.36		
		$V_{DD} = 5V$ $V_{is} = 5V$	$T_A = -55^\circ C$					-0.64	mA
			$T_A = -40^\circ C$					-0.61	
			$T_A = 25^\circ C$			-0.51			
			$T_A = 85^\circ C$				-0.42		
			$T_A = 125^\circ C$				-0.36		
		$V_{DD} = 10V$ $V_{is} = 0V$	$T_A = -55^\circ C$					1.6	mA
			$T_A = -40^\circ C$					1.5	
			$T_A = 25^\circ C$			1.3			
			$T_A = 85^\circ C$				1.1		
			$T_A = 125^\circ C$				0.9		
		$V_{DD} = 10V$ $V_{is} = 10V$	$T_A = -55^\circ C$					-1.6	mA
			$T_A = -40^\circ C$					-1.5	
			$T_A = 25^\circ C$			-1.3			
			$T_A = 85^\circ C$				-1.1		
			$T_A = 125^\circ C$				-0.9		
		$V_{DD} = 15V$ $V_{is} = 0V$	$T_A = -55^\circ C$					4.2	mA
			$T_A = -40^\circ C$					4	
			$T_A = 25^\circ C$			3.4			
			$T_A = 85^\circ C$				2.8		
$T_A = 125^\circ C$					2.4				
$V_{DD} = 15V$ $V_{is} = 15V$	$T_A = -55^\circ C$					-4.2	mA		
	$T_A = -40^\circ C$					-4			
	$T_A = 25^\circ C$			-3.4					
	$T_A = 85^\circ C$				-2.8				
	$T_A = 125^\circ C$				-2.4				

### 5.5 Electrical Characteristics (続き)

Over operating free-air temperature range,  $V_{SUPPLY} = \pm 5V$ , and  $R_L = 100 \Omega$ , (unless otherwise noted)<sup>(1)</sup>

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

### 5.5 Electrical Characteristics (続き)

Over operating free-air temperature range,  $V_{SUPPLY} = \pm 5V$ , and  $R_L = 100 \Omega$ , (unless otherwise noted)<sup>(1)</sup>

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

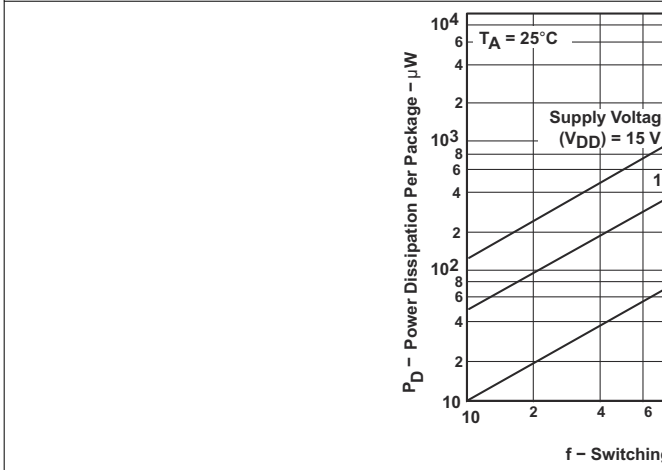
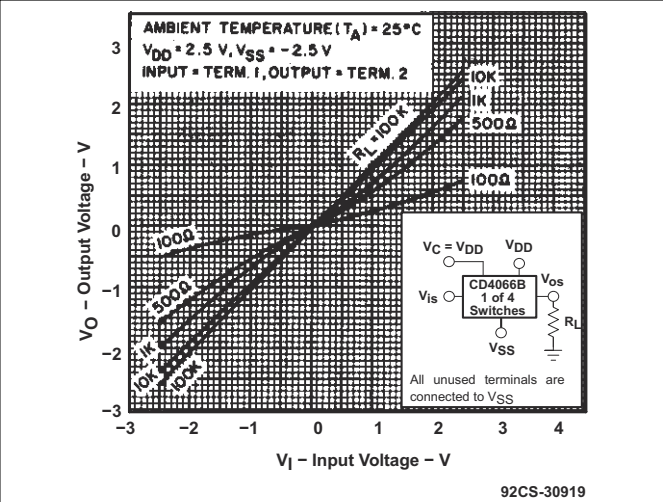
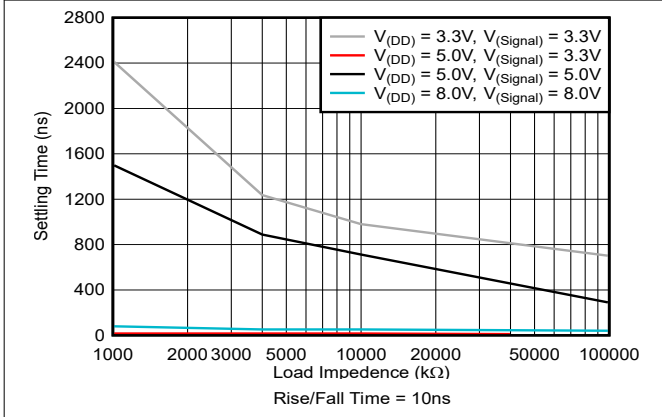
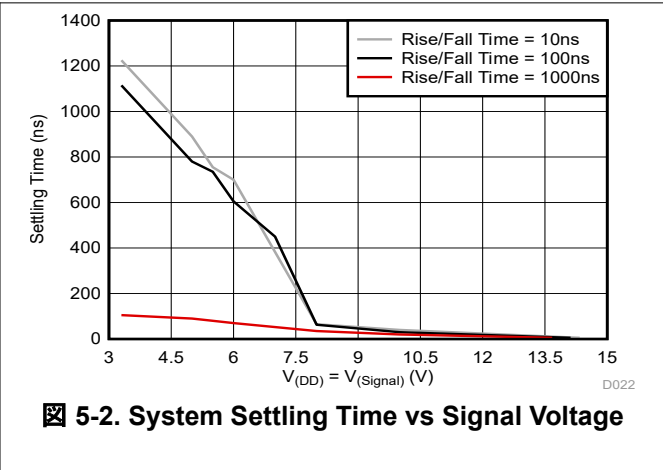
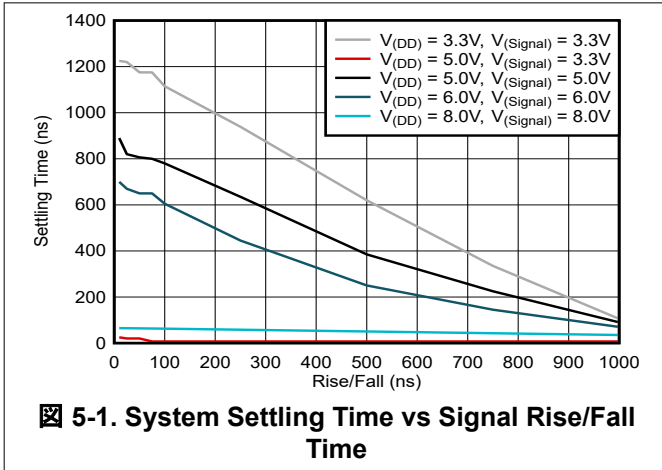
(1) Peak-to-Peak voltage symmetrical about  $(V_{DD} - V_{EE}) / 2$ .

### 5.6 Switching Characteristics

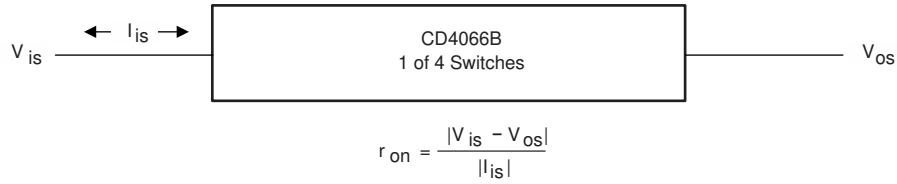
$T_A = 25^\circ C$

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

### 5.7 Typical Characteristics



## 6 Parameter Measurement Information



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

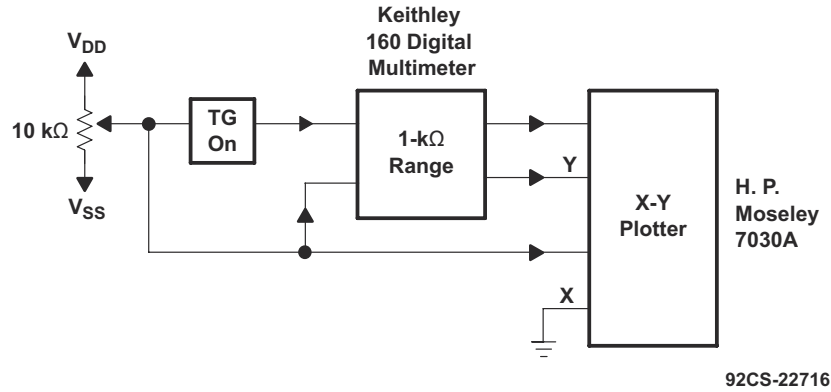
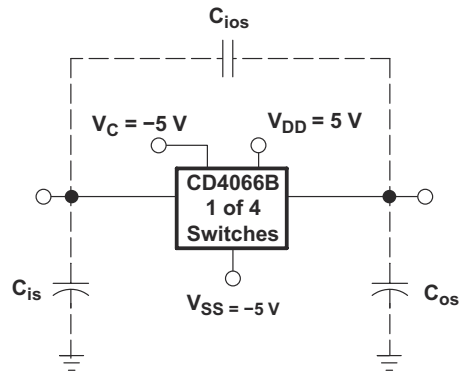
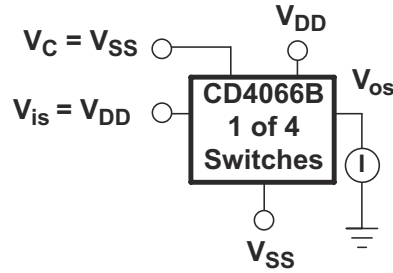


图 6-2. Channel On-State Resistance Measurement Circuit



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

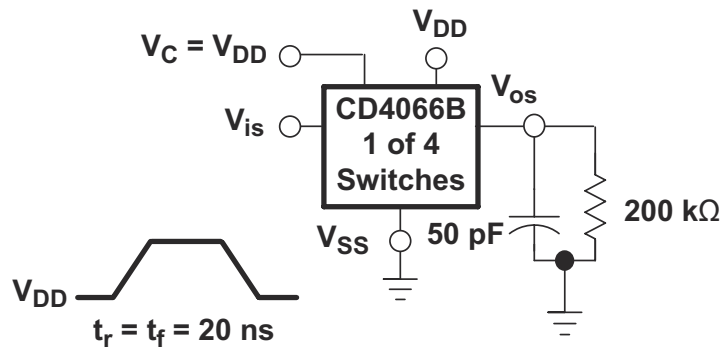
图 6-3. Typical On Characteristics for One of Four Channels



92CS-30922

All unused terminals are connected to  $V_{SS}$ .

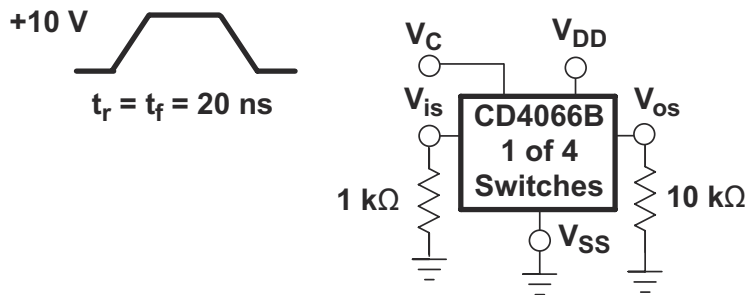
☒ 6-4. Off-Switch Input or Output Leakage



92CS-30923

All unused terminals are connected to  $V_{SS}$ .

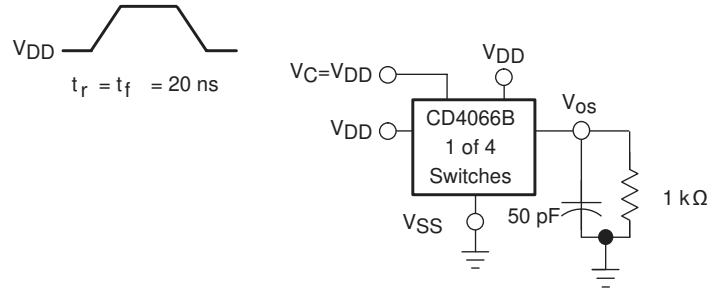
☒ 6-5. Propagation Delay Time Signal Input ( $V_{is}$ ) to Signal Output ( $V_{os}$ )



92CS-30924

All unused terminals are connected to  $V_{SS}$ .

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

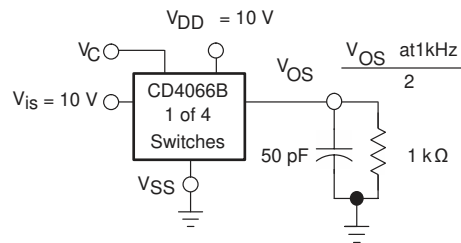
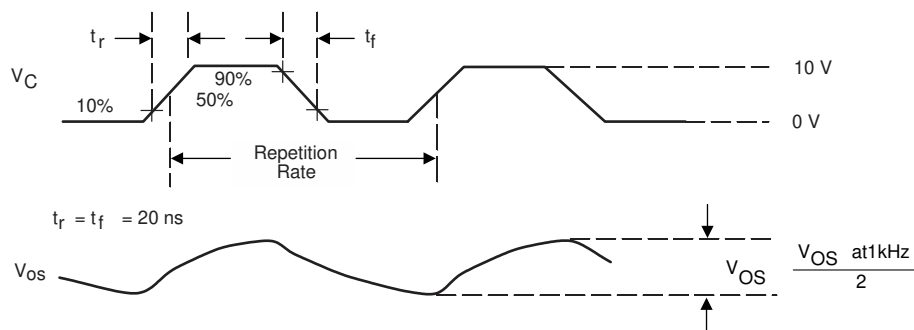


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All unused pins are connected to V<sub>SS</sub>.

Delay is measured at V<sub>OS</sub> level of +10% from ground (turn-on) or on-state output level (turn-off).

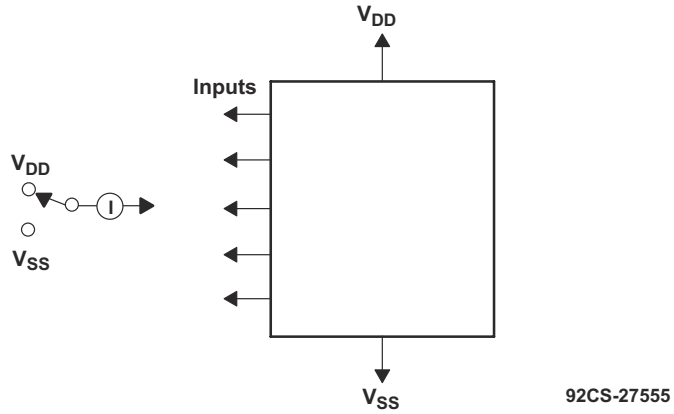
**6-7. Propagation Delay, t<sub>pLH</sub>, t<sub>pHL</sub> Control-Signal Output**



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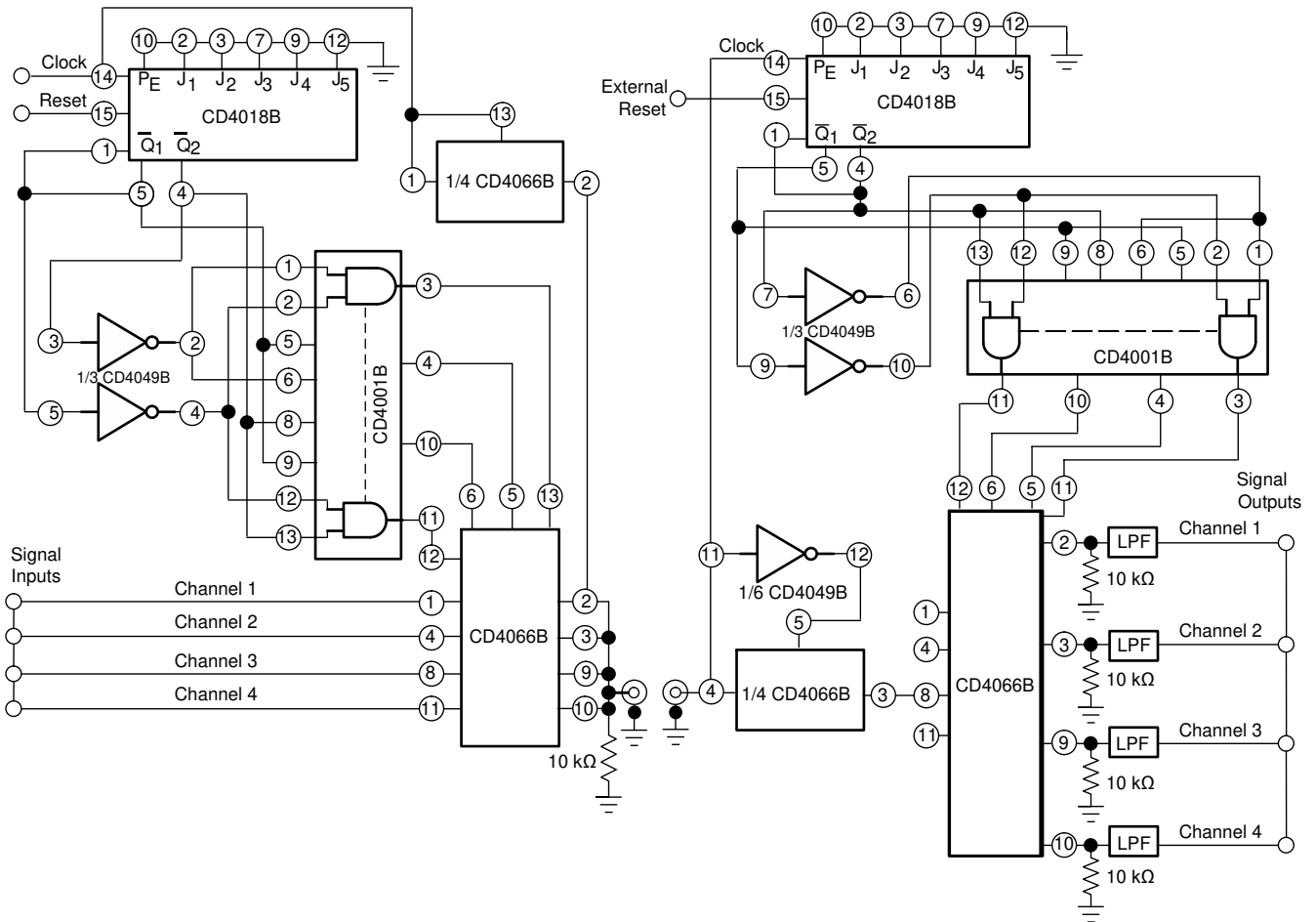
All unused pins are connected to V<sub>SS</sub>.

**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.

図 6-9. Input Leakage-Current Test Circuit



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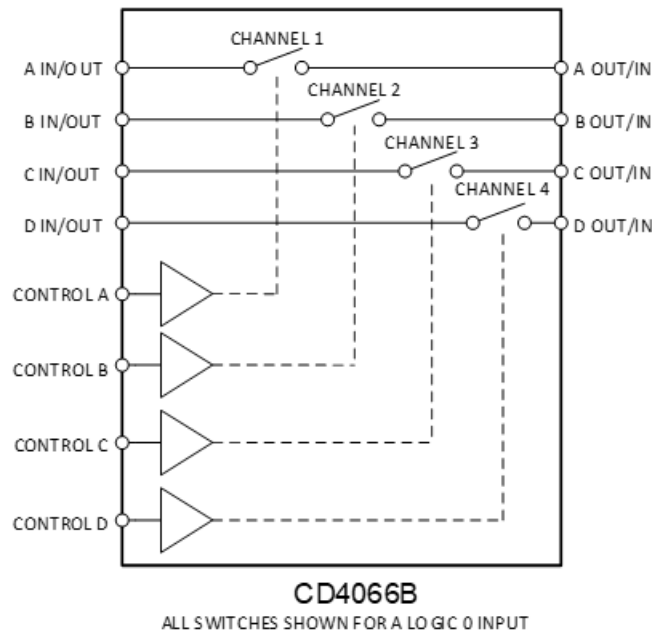
図 6-10. Four-Channel PAM Multiplex System Diagram

## 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:  $V_{SS} \leq V_{is} \leq V_{DD}$ .

**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.

## 7.4 Device Functional Modes

表 7-1 lists the functions of this device.

**表 7-1. Function Table**

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

## 8 Application and Implementation

### 注

以下のアプリケーション情報は、TI の製品仕様に含まれるものではなく、TI ではその正確性または完全性を保証いたしません。個々の目的に対する製品の適合性については、お客様の責任で判断していただくこととなります。お客様は自身の設計実装を検証しテストすることで、システムの機能を確認する必要があります。

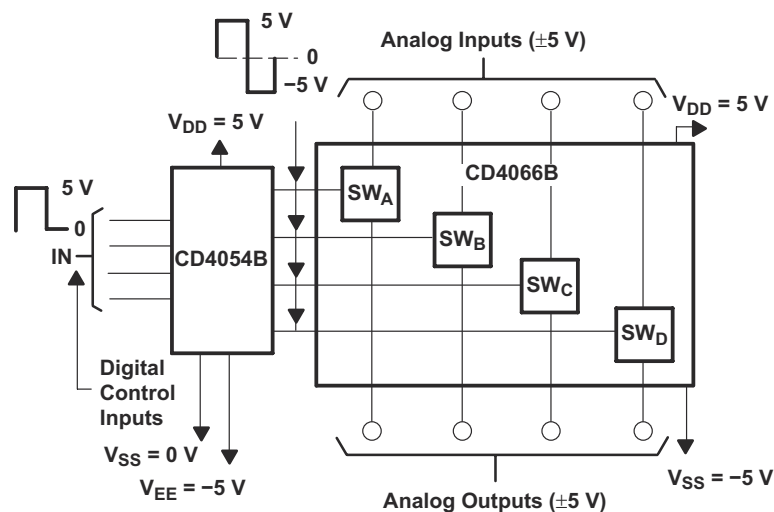
### 8.1 Application Information

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



92CS-30927

図 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

- Recommended input conditions:
  - For rise time and fall time specifications, see  $\Delta t/\Delta v$  in [Recommended Operating Conditions](#).
  - For specified high and low levels, see  $V_{IH}$  and  $V_{IL}$  in [Recommended Operating Conditions](#).
- Recommended output conditions:
  - Load currents should not exceed  $\pm 10\text{mA}$ .

### 8.2.3 Application Curve

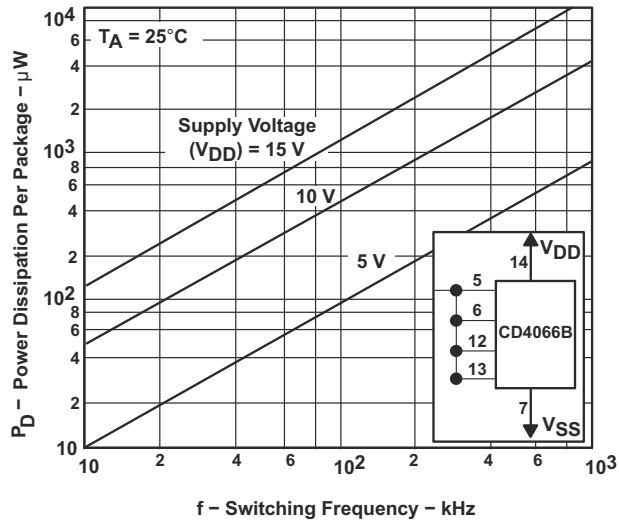


图 8-2. Power Dissipation vs. Switching Frequency

### 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, 0.1 $\mu\text{F}$  is recommended; if there are multiple VCC pins, then 0.01 $\mu\text{F}$  or 0.022 $\mu\text{F}$  is recommended for each power pin. It is acceptable to parallel multiple bypass capacitors to reject different frequencies of noise. A 0.1 $\mu\text{F}$  and a 1 $\mu\text{F}$  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

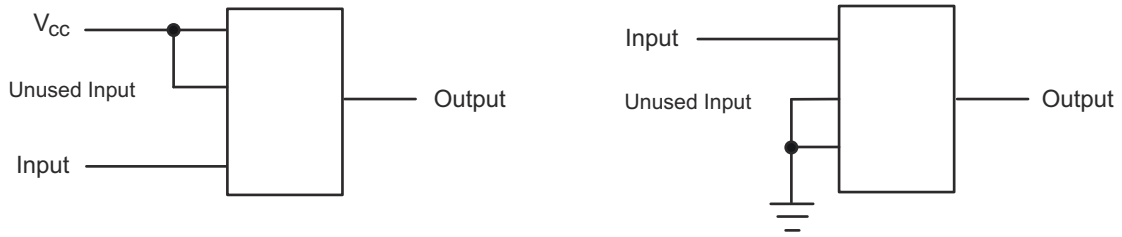


図 8-3. Diagram for Unused Inputs

## 9 Device and Documentation Support

### 9.1 ドキュメントの更新通知を受け取る方法

ドキュメントの更新についての通知を受け取るには、[www.tij.co.jp](http://www.tij.co.jp) のデバイス製品フォルダを開いてください。[通知] をクリックして登録すると、変更されたすべての製品情報に関するダイジェストを毎週受け取ることができます。変更の詳細については、改訂されたドキュメントに含まれている改訂履歴をご覧ください。

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### 9.5 用語集

[テキサス・インスツルメンツ用語集](#) この用語集には、用語や略語の一覧および定義が記載されています。

## 10 Revision History

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

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
• パッケージ サイズを含めるよう「パッケージ情報」表を変更.....	1
• ドキュメント全体にわたって表、図、相互参照の採番方法を変更.....	1
• データシートから J (CDIP、14) パッケージを削除.....	1
• Changed max and typ IDD for lower supply voltages.....	5
• Changed VIL from 2V to 1V across supply.....	5

Changes from Revision G (June 2017) to Revision H (January 2020)	Page
• Added Junction Temperature details to the <i>Absolute Maximum Ratings</i> 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.

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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)
<a href="#">CD4066BE</a>	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
<a href="#">CD4066BF</a>	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
<a href="#">CD4066BF3A</a>	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
<a href="#">CD4066BM</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
<a href="#">CD4066BM96</a>	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
<a href="#">CD4066BM96G4</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
<a href="#">CD4066BMT</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	-55 to 125	CD4066BM
<a href="#">CD4066BNS</a>	Obsolete	Production	SOP (NS)   14	-	-	Call TI	Call TI	-55 to 125	CD4066B
<a href="#">CD4066BNSR</a>	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
<a href="#">CD4066BPW</a>	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-55 to 125	CM066B
<a href="#">CD4066BPWR</a>	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
<a href="#">CD4066BPWRG4</a>	Obsolete	Production	TSSOP (PW)   14	-	-	Call TI	Call TI	-55 to 125	CM066B
<a href="#">JM38510/05852BCA</a>	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
<a href="#">M38510/05852BCA</a>	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.

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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 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**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**

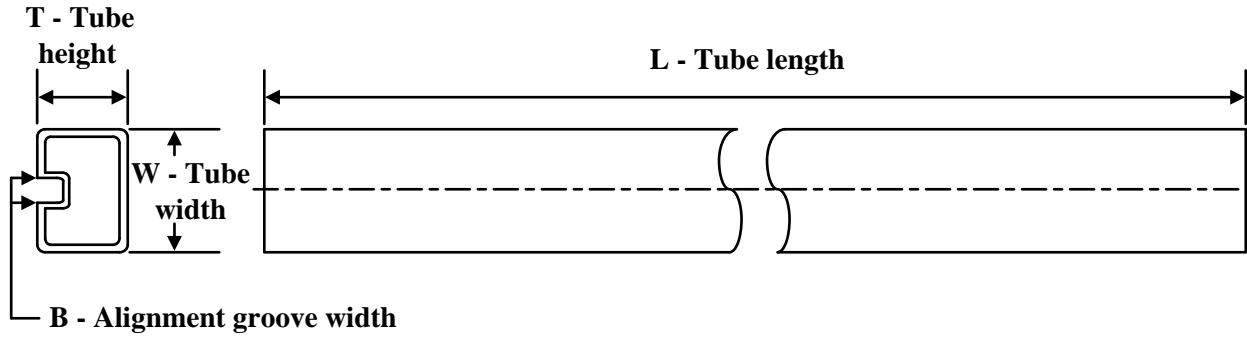

\*All dimensions are nominal

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



# 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.



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



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



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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.



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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



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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

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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.

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