

High-Voltage Types (20-Volt Rating)

CD4045B Types

STATIC ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	CONDITIONS			LIMITS AT INDICATED TEMPERATURES (°C)							UNITS
	V _O (V)	V _{IN} (V)	V _{DD} (V)	-55	-40	+85	+125	+25			
								Min.	Typ.	Max.	
Quiescent Device Current, I _{DD} Max.	—	0,5	5	5	5	150	150	—	0.04	5	μA
	—	0,10	10	10	10	300	300	—	0.04	10	
	—	0,15	15	20	20	600	600	—	0.04	20	
	—	0,20	20	100	100	3000	3000	—	0.08	100	
Output Low (Sink) Current I _{OL} Min.	0.4	0,5	5	4.5	4.3	2.9	2.5	3.6	7	—	mA
	0.5	0,10	10	11.2	10.5	7.7	6.3	9.1	18	—	
	1.5	0,15	15	29.4	28	19.6	16.8	23.8	47	—	
Output High (Source) Current, I _{OH} Min.	4.6	0,5	5	-4.5	-4.3	-2.9	-2.5	-3.6	-7	—	mA
	9.5	0,10	10	-11.2	-10.5	-7.7	-6.3	-9.1	-18	—	
	13.5	0,15	15	-29.4	-28	-19.6	-16.8	-23.8	-47	—	
Pin 15 Output Low and High Current, I _{OL} , I _{OH}	0.4,4.6	0,5	5	—				±0.1	±0.18	—	mA
	0.5,9.5	0,10	10	—				±0.2	±0.3	—	
	1.5,13.5	0,15	15	—				±0.5	±1	—	
Output Voltage: Low-Level, V _{OL} Max.	—	0,5	5	0.05				—	—	0.05	V
	—	0,10	10	0.05				—	—	0.05	
	—	0,15	15	0.05				—	—	0.05	
Output Voltage: High-Level, V _{OH} Min.	—	0,5	5	4.95				4.95	5	—	V
	—	0,10	10	9.95				9.95	10	—	
	—	0,15	15	14.95				14.95	15	—	
Input Low Voltage V _{IL} Max.	0.5,4.5	—	5	1.5				—	—	1.5	V
	1,9	—	10	3				—	—	3	
	1.5,13.5	—	15	4				—	—	4	
Input High Voltage, V _{IH} Min.	0.5,4.5	—	5	3.5				3.5	—	—	V
	1,9	—	10	7				7	—	—	
	1.5,13.5	—	15	11				11	—	—	
Input Current I _{IN} Max.	—	0,18	18	±0.1	±0.1	±1	±1	—	±10 ⁻⁵	±0.1	μA

RECOMMENDED OPERATING CONDITIONS

For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges

CHARACTERISTIC	V _{DD} (V)	LIMITS		UNITS
		Min.	Max.	
Supply-Voltage Range (For T _A = Full Package-Temperature Range)	—	3	18	V
Minimum Input-Pulse Width, t _W	5	—	100	ns
	10	—	50	
	15	—	40	
Maximum Input-Pulse Frequency, f _{ϕ} (External Pulse Source)	5	5	—	MHz
	10	12	—	
	15	15	—	

3
COMMERCIAL CMOS
HIGH VOLTAGE ICs

CD4045B Types

DYNAMIC ELECTRICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$; Input $t_r, t_f = 20\text{ ns}$,
 $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$

CHARACTERISTIC	TEST CONDITIONS	V_{DD} V	LIMITS			UNITS
			Min.	Typ.	Max.	
Propagation Delay Time: ϕ_I to y or y+d out t_{PHL}, t_{PLH}		5 10 15	— — —	2.2 0.9 0.65	5.5 2.7 2	μs
Transition Time: t_{THL}, t_{TLH}		5 10 15	— — —	25 13 10	50 25 20	ns
Minimum Input-Pulse Width t_W		5 10 15	— — —	50 25 20	100 50 40	ns
Input-Pulse Rise or Fall Time: $t_r\phi, t_f\phi$		5 10 15	— — —	— — —	500 500 500	μs
Maximum Input-Pulse Frequency: (External Pulse Source) f_ϕ		5 10 15	5 12 15	10 25 30	— — —	MHz
Input Capacitance, C_{IN}	Any Input		—	5	7.5	pF
Variation of Output Frequency (Unit-to-Unit)	$f = 5\text{ MHz}$	5 10 15	— — —	0.05 0.03 0.1	— — —	%
RC Oscillator Operation						
Maximum Oscillator Frequency (See Fig. 11) f_{osc}	$R_X = 50\text{ k}\Omega$, $R_S = 560\text{ k}\Omega$, $C_X = 50\text{ pF}$	5 10 15	45 45 45	60 60 60	75 75 75	kHz

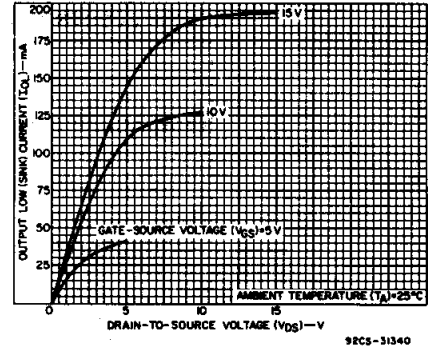


Fig. 2 - Typical output low (sink) current characteristics.

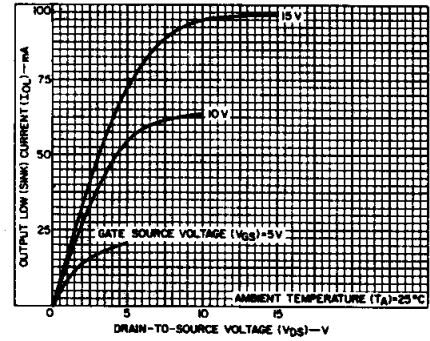


Fig. 3 - Minimum output low (sink) current characteristics.

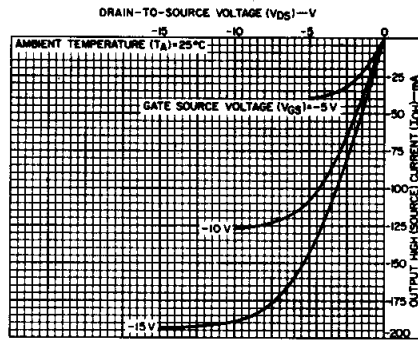


Fig. 4 - Typical output high (source) current characteristics.

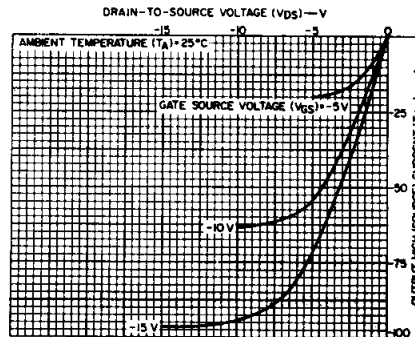


Fig. 5 - Minimum output high (source) current characteristics.

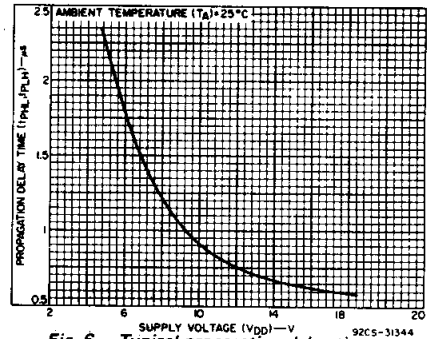


Fig. 6 - Typical propagation delay time as a function of supply voltage (ϕ_I to y or y + d out vs. V_{DD}).

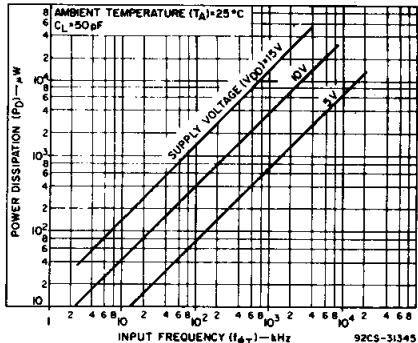


Fig. 7 - Typical power dissipation as a function of input frequency (21 counting stages).

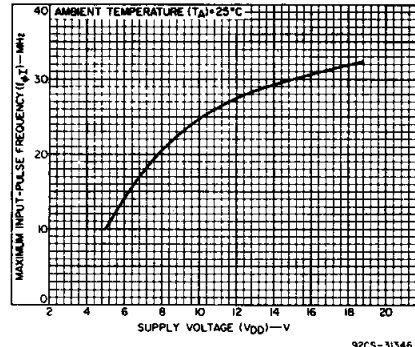


Fig. 8 - Typical maximum input-pulse frequency as a function of supply voltage.

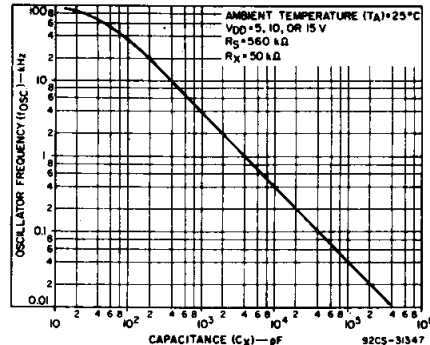


Fig. 9 - Typical RC oscillator frequency as a function of capacitance (C_X), See Fig. 11.

CD4045B Types

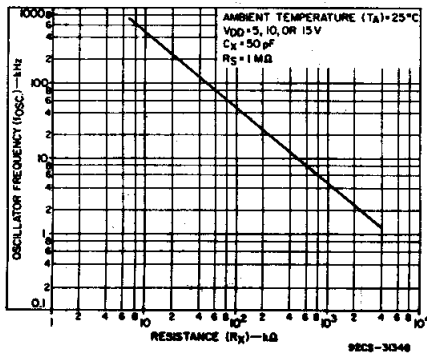


Fig. 10 - Typical RC oscillator frequency as a function of resistance (R_X). See Fig. 11.

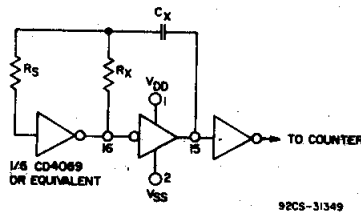


Fig. 11 - Typical RC circuit.

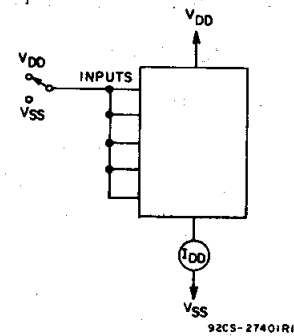


Fig. 12 - Quiescent-device-current test circuit.

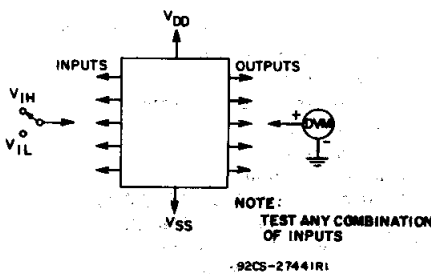


Fig. 13 - Noise-immunity test circuit.

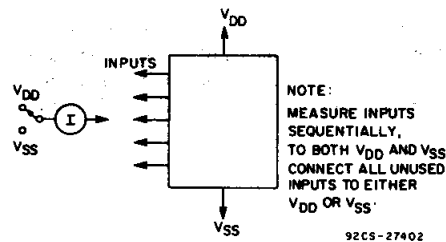


Fig. 14 - Input-leakage-current test circuit.

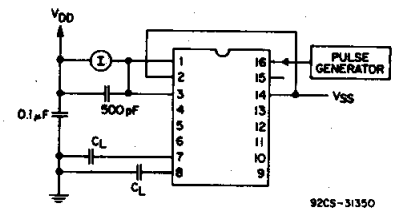
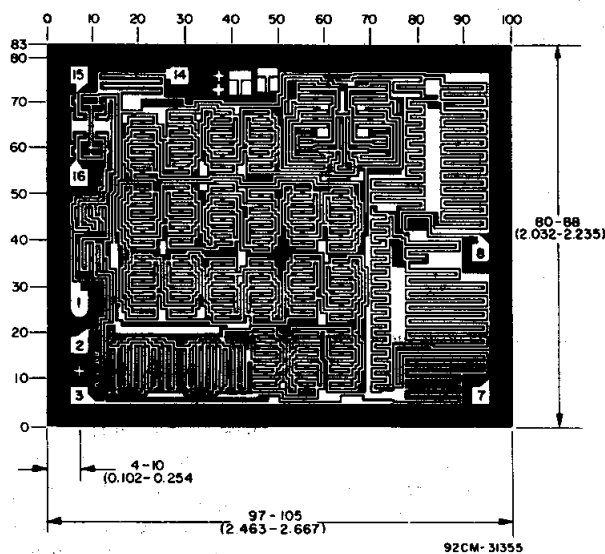


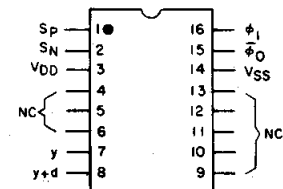
Fig. 15 - Dynamic power dissipation test circuit.



Chip dimensions and pad layout for CD4045B

Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10^{-3} inch).

TERMINAL DIAGRAM Top View



92CS-24478R2

NC = NO CONNECTION

NOTE Observe power-supply terminal connections, V_{DD} is terminal No. 3 and V_{SS} is terminal No. 14 (not 16 and 8 respectively, as in other CD4000B Series 16-lead devices).

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)
CD4045BE	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4045BE
CD4045BE.A	Active	Production	PDIP (N) 16	25 TUBE	Yes	NIPDAU	N/A for Pkg Type	-55 to 125	CD4045BE

⁽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.

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
CD4045BE	N	PDIP	16	25	506	13.97	11230	4.32
CD4045BE	N	PDIP	16	25	506	13.97	11230	4.32
CD4045BE.A	N	PDIP	16	25	506	13.97	11230	4.32
CD4045BE.A	N	PDIP	16	25	506	13.97	11230	4.32

N (R-PDIP-T**)

16 PINS SHOWN

PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	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	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.
-  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.

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATA SHEETS), 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 will 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](#) or other applicable terms available either on [ti.com](https://www.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.

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

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2025, Texas Instruments Incorporated