



THE DATASHEET OF CD4056BNSR



CD4054B, CD4055B, CD4056B Types

CMOS Liquid-Crystal Display Drivers

High-Voltage Types (20-Volt Rating)

CD4054B – 4-Segment Display Driver

CD4055B – BCD to 7-Segment Decoder/Driver with “Display-Frequency” Output

CD4056B – BCD to 7-Segment Decoder/Driver with Strobed-Latch Function

■ CD4055B and CD4056B types are single-digit BCD-to-7-segment decoder/driver circuits that provide level-shifting functions on the chip. This feature permits the BCD input-signal swings (V_{DD} to V_{SS}) to be the same as or different from the 7-segment output-signal swings (V_{DD} to V_{EE}). For example, the BCD input-signal swings (V_{DD} to V_{SS}) may be as small as 0 to -3 V, whereas the output-display drive-signal swing (V_{DD} to V_{EE}) may be as large as from 0 to -15 V. If V_{DD} to V_{EE} exceeds 15 V, V_{DD} to V_{SS} should be at least 4V (0 to -4 V).

The 7-segment outputs are controlled by the DISPLAY-FREQUENCY (DF) input which causes the selected segment outputs to be low, high, or a square-wave output (for liquid-crystal displays). When the DF input is low the output segments will be high when selected by the BCD inputs. When the DF input is high, the output segments will be low when selected by the BCD inputs. When a square-wave is present at the DF input, the selected segments will have a square-wave output that is 180° out of phase with the DF input. Those segments which are not selected will have a square-wave output that is in phase with the input. DF square-wave repetition rates for liquid-crystal displays usually range from 30 Hz (well above flicker rate) to 200 Hz (well below the upper limit of the liquid-crystal frequency response). The CD4055B provides a level-shifted high-amplitude DF output which is required for driving the common electrode in liquid-crystal displays. The CD4056B provides a strobed-latch function at the BCD inputs. Decoding of all input combinations on the CD4055B and CD4056B provides displays of 0 to 9 as well as L, P, H, A, $-$, and a blank position.

The CD4054B provides level shifting similar to the CD4055B and CD4056B independently strobed latches, and common DF control on 4 signal lines. The CD4054B is intended to provide drive-signal compatibility with the CD4055B and CD4056B 7-segment decoder types for the decimal point, colon, polarity, and similar display lines. A level-shifted high-amplitude DF output can be obtained from any CD4054B output line by connect-

Features:

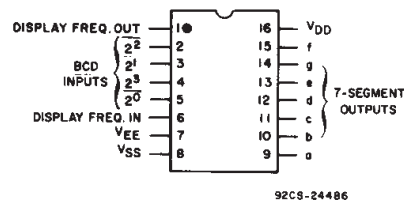
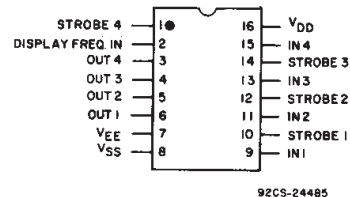
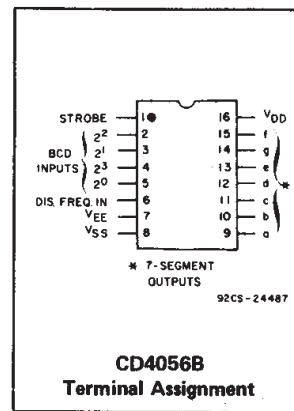
- Operation of liquid crystals with CMOS circuits provides ultra-low-power displays
- Equivalent ac output drive for liquid-crystal displays – no external capacitor required
- Voltage doubling across display, e.g. $V_{DD} - V_{EE} = 18$ V results in effective 36 V p-p drive across selected display segments
- Low- or high-output level dc drive for other types of displays
- On-chip logic-level conversion for different input- and output-level swings
- Full decoding of all input combinations: 0-9, L, H, P, A, $-$, and blank positions
- Strobed-latch function—CD4054B Series and CD4056B Series
- DISPLAY-FREQUENCY (DF) output for liquid-crystal common-line drive signal—CD4055B Series (CD4054B Series also: see introductory text)
- 100% tested for quiescent current at 20 V
- Maximum input current of 1 μ A at 18 V over full package temperature range; 100 nA at 18 V and 25°C
- Noise margin (over full package temperature range):
 - 1 V at $V_{DD} = 5$ V
 - 2 V at $V_{DD} = 10$ V
 - 2.5 V at $V_{DD} = 15$ V
- 5-V, 10-V, and 15-V parametric ratings

Applications

- General-purpose displays
- Calculators and meters
- Wall and table clocks
- Industrial control panels
- Portable lab instruments
- Panel meters
- Auto dashboard displays
- Appliance control panels

ing the corresponding input and strobe lines to a low and high level, respectively and applying a square wave to DF IN. The CD4054B may also be utilized for logic-level “up conversion” or “down conversion”. For example, input-signal swings (V_{DD} to V_{SS}) from +5 to 0 V can be converted to output-signal swings (V_{DD} to V_{EE}) of +5 to -5 V. The level-shifted function on all three types permits the use of different input- and output-signal swings. The input swings from a low level of V_{SS} to a high level of V_{DD} while the output swings from a low level of V_{EE} to the same high level of V_{DD} . Thus, the input and output swings can be selected independently of each other over a 3-to-18 V range. V_{SS} may be connected to V_{EE} when no level-shift function is required.

For the CD4054B and CD4056B, data are



transferred from input to output by placing a high voltage level at the strobe input. A low voltage level at the strobe input latches the data input and the corresponding output segments remain selected (or non-selected) while the strobe is low.

Whenever the level-shifting function is required, the CD4055B can be used by itself to drive a liquid-crystal display (Fig.16 and Fig.20). The CD4056B, however, must be used together with a CD4054B to provide the common DF output (Fig.19). The capability of extending the voltage swing on the negative end (this voltage cannot be extended on the positive end) can be used to advantage in the setup of Fig.18. Fig.17 is common to all three types.

The CD4054B-, CD4055B-, and CD4056B-series types are supplied in 16-lead dual-in-line plastic packages (E suffix), 16-lead small-outline packages (M, M96, MT, and NSR suffixes), and 16-lead thin shrink small-outline packages (PW and PWR suffixes). The CD4054B- and CD4056B-series types also are supplied in 16-lead hermetic dual-in-line ceramic packages (F3A suffix).

3
COMMERCIAL CMOS
HIGH VOLTAGE ICs

CD4054B, CD4055B, CD4056B Types

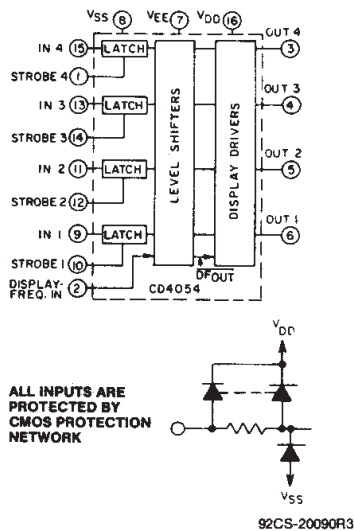


Fig. 1 - CD4054B functional diagram.

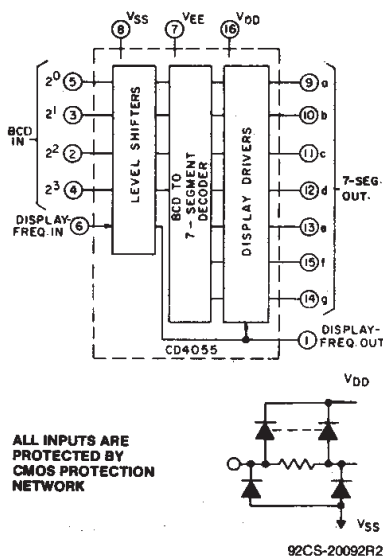


Fig. 2 - CD4055B functional diagram.

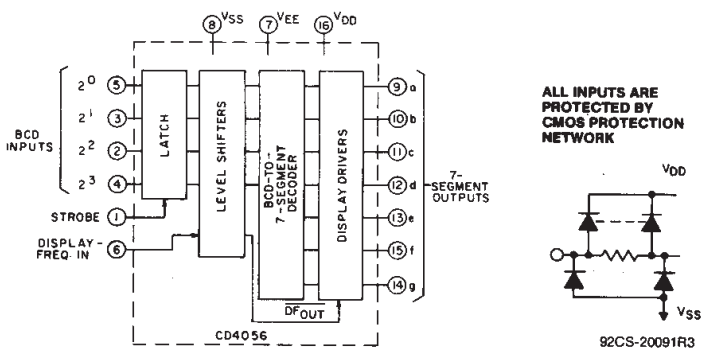


Fig. 3 - CD4056B functional diagram.

CD4054B TRUTH TABLE

DF	IN	ST	OUT
0	0	1	0
1	0	1	1
0	1	1	1
1	1	1	0
X	X	0	*

X = Don't Care.

*Depends upon the input mode previously applied when ST = 1.

TRUTH TABLE FOR CD4055B and CD4056B

INPUT CODE				OUTPUT STATE							DISPLAY CHARACTER
2 ³	2 ²	2 ¹	2 ⁰	a	b	c	d	e	f	g	
0	0	0	0	1	1	1	1	1	1	0	□
0	0	0	1	0	1	1	0	0	0	0	□
0	0	1	0	1	1	0	1	1	0	1	□
0	0	1	1	1	1	1	1	0	0	1	□
0	1	0	0	0	1	1	0	0	1	1	□
0	1	0	1	1	0	1	1	0	1	1	□
0	1	1	0	1	0	1	1	1	1	1	□
0	1	1	1	1	1	1	0	0	0	0	□
1	0	0	0	1	1	1	1	1	1	1	□
1	0	0	1	1	1	1	1	0	1	1	□
1	0	1	0	0	0	0	1	1	1	0	□
1	0	1	1	0	1	1	0	1	1	1	□
1	1	0	0	1	1	0	0	1	1	1	□
1	1	0	1	1	1	1	0	1	1	1	□
1	1	1	0	0	0	0	0	0	0	1	□
1	1	1	1	0	0	0	0	0	0	0	BLANK

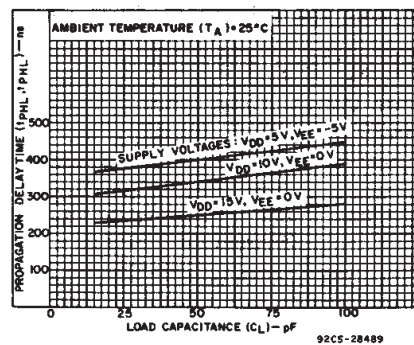


Fig. 4 - Typical propagation delay time vs. load capacitance for CD4054B.

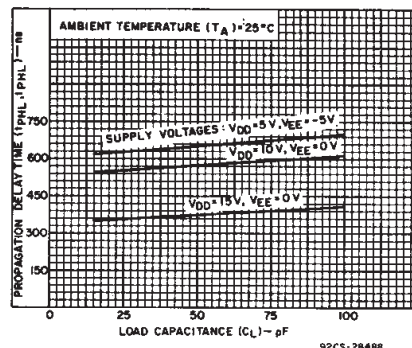


Fig. 5 - Typical propagation delay time vs. load capacitance for CD4055 and CD4056B.

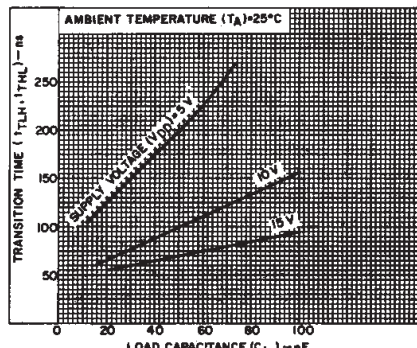


Fig. 6 - Typical transition time vs. load capacitance.

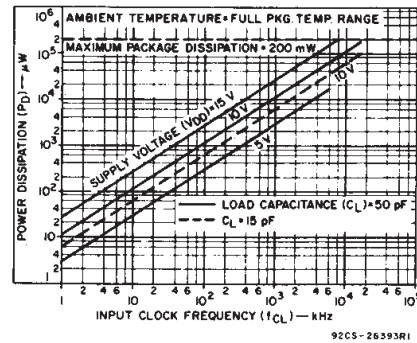


Fig. 7 - Typical input clock frequency vs. power dissipation.

CD4054B, CD4055B, CD4056B Types

MAXIMUM RATINGS, Absolute-Maximum Values:

DC SUPPLY-VOLTAGE RANGE, (V_{DD})

Voltages referenced to V_{SS} Terminal) -0.5V to +20V

INPUT VOLTAGE RANGE, ALL INPUTS -0.5V to V_{DD} +0.5V

DC INPUT CURRENT, ANY ONE INPUT ±10mA

POWER DISSIPATION PER PACKAGE (P_D):

For T_A = -55°C to +100°C 500mW

For T_A = +100°C to +125°C Derate Linearly at 12mW/°C to 200mW

DEVICE DISSIPATION PER OUTPUT TRANSISTOR

FOR T_A = FULL PACKAGE-TEMPERATURE RANGE (All Package Types) 100mW

OPERATING-TEMPERATURE RANGE (T_A) -55°C to +125°C

STORAGE TEMPERATURE RANGE (T_{stg}) -65°C to +150°C

LEAD TEMPERATURE (DURING SOLDERING):

At distance 1/16 ± 1/32 inch (1.59 ± 0.79mm) from case for 10s max +265°C

STATIC ELECTRICAL CHARACTERISTICS

Characteristic	CONDITIONS					LIMITS AT INDICATED TEMPERATURES (°C)							Units
	V _{EE} (V)	V _{SS} (V)	V _O (V)	V _{IN} (V)	V _{DD} (V)	-55°	-40°	+85°	+125°	+25°C			
										Min.	Typ.	Max.	
Quiescent Device Current, I _{DD} MAX.	-5	0			5	5	150	150	-	0.04	5	μA	
	0	0			10	10	300	300	-	0.04	10		
	0	0			15	20	600	600	-	0.04	20		
	0	0			20	100	3000	3000	-	0.08	100		
Output Voltage: Low Level, V _{OL} MAX.	0	0		0.5	5			0.05	-	0	0.05	V	
	0	0		0.10	10			0.05	-	0	0.05		
	0	0		0.15	15			0.05	-	0	0.05		
	0	0		0.5	5			4.95	4.95	5	-		
High Level, V _{OH} MIN.	0	0		0.10	10			9.95	9.95	10	-	V	
	0	0		0.15	15			14.95	14.95	15	-		
Input Low Voltage, V _{IL} MAX.	0	0	0.5,		5			1.5	-	-	1.5	V	
	0	0	1.9		10			3	-	-	3		
	0	0	1.5, 13.5		15			4	-	-	4		
Input High Voltage, V _{IH} MIN.	-5	0	0.5, 4.5		5			3.5	3.5	-	-	V	
	0	0	1.9		10			7	7	-	-		
	0	0	1.5, 13.5		15			11	11	-	-		
Output Low (Sink) Current, I _{OL}	-5	0	-4.5		5	0.98	0.92	0.67	0.55	0.8	1.6	mA	
	0	0	0.5		10	0.98	0.92	0.67	0.55	0.8	1.6		
	0	0	1.5		15	3.6	3.4	2.4	2	2.9	5.8		
Output High (Source) Current, I _{OH}	-5	0	4.5		5	-0.6	-0.55	-0.35	-0.3	-0.45	-0.9	mA	
	0	0	9.5		10	-0.6	-0.55	-0.35	-0.3	-0.45	-0.9		
	0	0	13.5		15	-1.9	-1.8	-1.2	-1.1	-1.5	-3		
Input Current, I _{IN}	0	0	-	0.18	18	±0.1	±0.1	±1	±1	-	±10 ⁻⁵	±0.1	μA

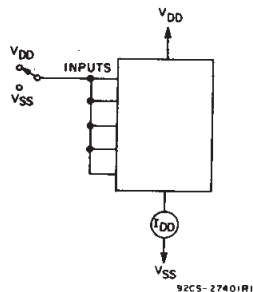


Fig. 11 - Quiescent-device-current test circuit.

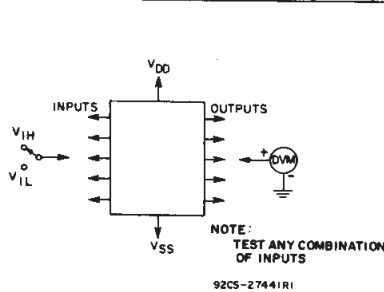


Fig. 12 - Input-voltage test circuit.

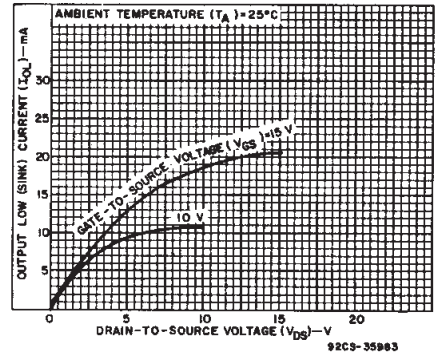


Fig. 8 - Typical n-channel output low (sink) current characteristics.

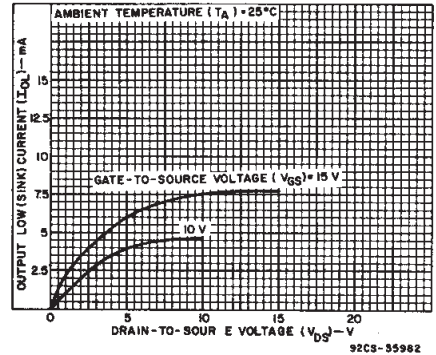


Fig. 9 - Minimum n-channel output low (sink) current characteristics.

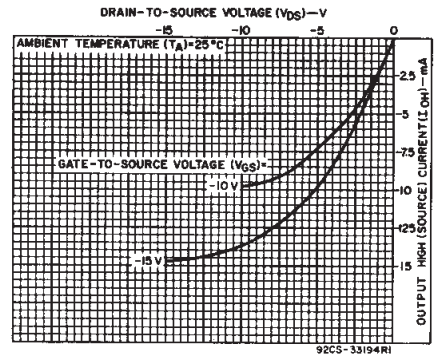


Fig. 10 - Typical p-channel output high (source) current characteristics.

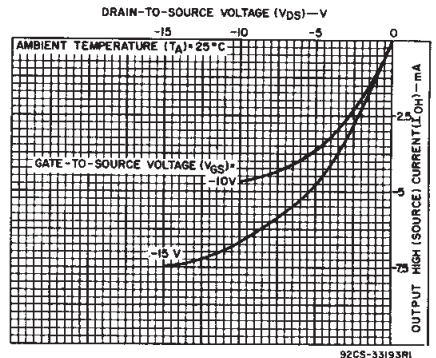


Fig. 13 - Minimum p-channel output high (source) current characteristics.

3
COMMERCIAL CMOS
HIGH VOLTAGE ICs

CD4054B, CD4055B, CD4056B Types

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

CHARACTERISTIC	CONDITIONS			LIMITS				UNITS
	V _{EE} (V)	V _{SS} (V)	V _{DD} (V)	ALL PACKAGE TYPES				
				CD4054		CD4055, CD4056		
Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.	
Propagation Delay Time, t_{PHL}, t_{PLH} (Any Input to Any Output)	-5	0	5	400	800	650	1300	ns
	0	0	10	340	680	575	1150	
	0	0	15	250	500	375	750	
Transition Time, t_{THL}, t_{TLH} (Any Output)	-5	0	5	100	200	100	200	ns
	0	0	10	100	200	100	200	
	0	0	15	75	150	75	150	
Minimum Data Setup Time, t_S^*	-5	0	5	110	220	110	220	ns
	0	0	10	50	100	50	100	
			15	35	70	35	70	
Minimum Strobe Pulse Width, t_W^*	-5	0	5	110	220	110	220	ns
	0	0	10	50	100	50	100	
	0	0	15	35	70	35	70	
Input Capacitance, C_{iN} (Any Input)	-	-	-	5	7.5	5	7.5	pF

* CD4054 and CD4056 only.

RECOMMENDED OPERATING CONDITIONS at $T_A = 25^\circ\text{C}$ (Unless otherwise specified)
For maximum reliability, nominal operating conditions should be selected so that operation is always within the following ranges.

CHARACTERISTIC	V _{EE} (V)	V _{SS} (V)	V _{DD} (V)	LIMITS		UNITS
				Min.	Max.	
Supply Voltage Range: (At T_A = Full Package Temperature Range)				3	18	V
Setup Time (t_S) [•]	-5	0	5	220	-	ns
	0	0	10	100	-	
	0	0	15	70	-	
Strobe Pulse Width (t_W) [•]	-5	0	5	220	-	ns
	0	0	10	100	-	
	0	0	15	70	-	

• For CD4054 and CD4056 only.

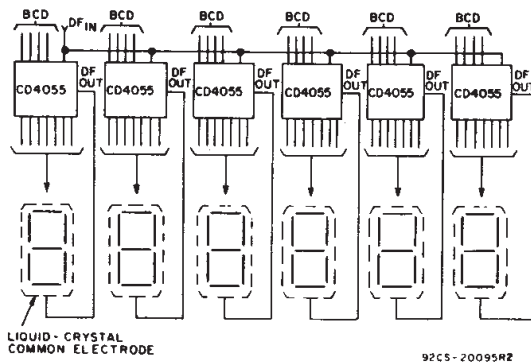


Fig. 16 - Clock display: $V_{DD} = 0\text{ V}$, $V_{SS} = -5\text{ V}$, $V_{EE} = -15\text{ V}$, $DF_{IN} = 30\text{ Hz}$ square wave.

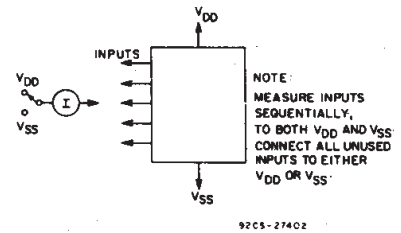


Fig. 14 - Input-current test circuit.

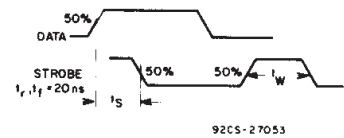


Fig. 15 - Data setup time and strobe pulse duration.

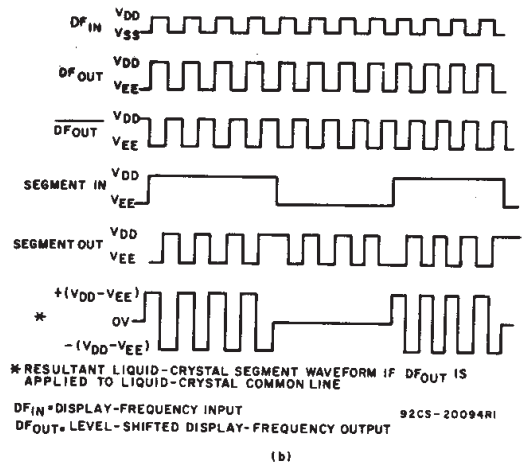
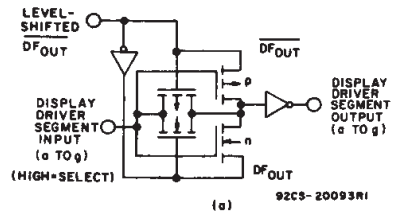


Fig. 17 - Display-driver circuit for one segment line and waveforms.

CD4054B, CD4055B, CD4056B Types

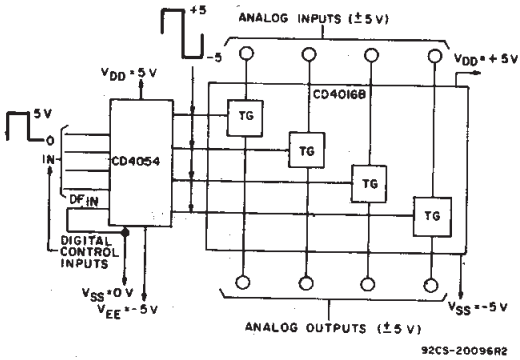


Fig. 18 - Digital (0 to +5 V) to bidirectional analog control (+5 to -5 V) level shifter.

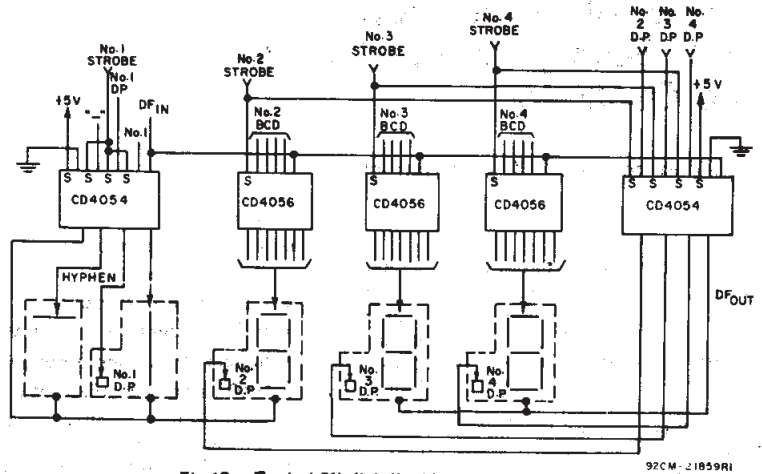


Fig. 19 - Typical 3 1/2-digit liquid-crystal display: VDD = +5 V, VSS = 0 V, VEE = -10 V, DF IN = 30 Hz square wave.

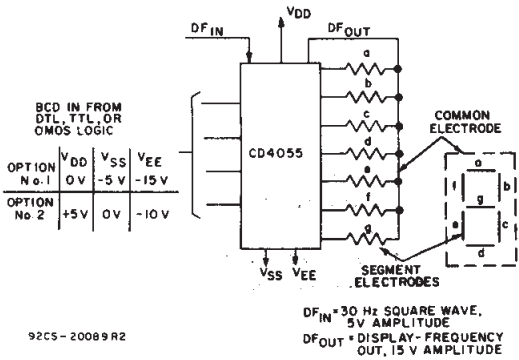


Fig. 20 - Single-digit liquid-crystal display.

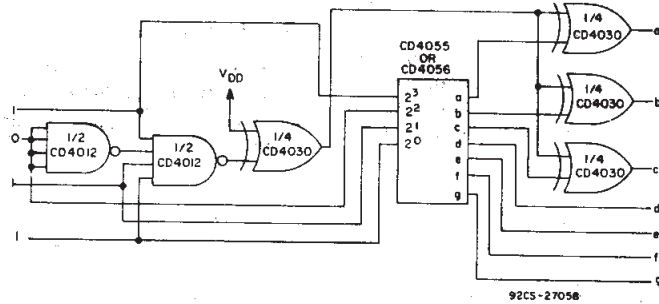


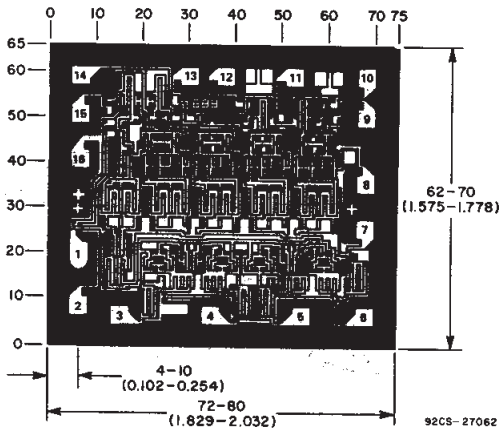
Fig. 21 - Conversion of "H" display to "F" display.

In addition to the letters L, H, P, and A (See the truth table), five other letters can be displayed through the use of simple logic circuits preceding and following the CD4055B or CD4056B devices. Fig. 21 is an example of a circuit that converts an "H" display (code 1011) to an "F" display. One condition that must be met is that VEE = VSS. If VEE ≠ VSS, the CD4054B must be used to level shift in the appropriate places.

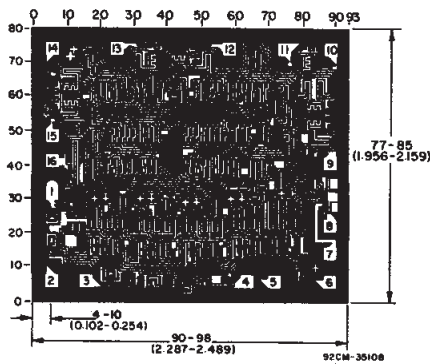
In a similar manner the letters C, E, J, and U can be displayed. These circuits can also be used to drive LED displays provided the exclusive-OR gates have sufficient output-current drive.

The letters B, D, G, I, O, and S may be represented by the codes for numbers 8, 0, 6, 1, 0, and 5, respectively, when there is pre-knowledge that only letters are to be displayed.

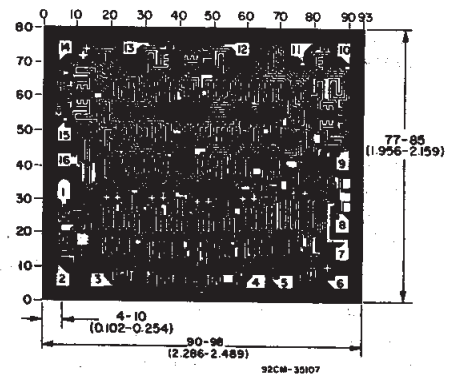
Dimensions in parentheses are in millimeters and are derived from the basic inch dimensions as indicated. Grid graduations are in mils (10⁻³ inch).



Dimensions and pad layout for CD4054BH.



Dimensions and pad layout for CD4055BH



Dimensions and pad layout for CD4056BH

3
COMMERCIAL CMOS
HIGH VOLTAGE ICs

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
CD4054BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4054BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4054BF3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type
CD4054BM	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BM96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BM96E4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BM96G4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BME4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BMG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BMT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BMTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BMTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BNSRE4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4054BNSRG4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4054BPW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BPWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BPWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4054BPWRE4	ACTIVE	TSSOP	PW	16		TBD	Call TI	Call TI
CD4054BPWRG4	ACTIVE	TSSOP	PW	16		TBD	Call TI	Call TI
CD4055BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4055BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4055BM	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BM96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BM96E4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BM96G4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BME4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BMG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
CD4055BMT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BMTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BMTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BNSRE4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4055BNSRG4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4055BPW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BPWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BPWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4055BPWRE4	ACTIVE	TSSOP	PW	16		TBD	Call TI	Call TI
CD4055BPWRG4	ACTIVE	TSSOP	PW	16		TBD	Call TI	Call TI
CD4056BE	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4056BEE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
CD4056BF3A	ACTIVE	CDIP	J	16	1	TBD	A42	N / A for Pkg Type
CD4056BM	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BM96	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BM96E4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BM96G4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BME4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BMG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BMT	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BMTE4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BMTG4	ACTIVE	SOIC	D	16	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BNSRE4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4056BNSRG4	ACTIVE	SO	NS	16		TBD	Call TI	Call TI
CD4056BPW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BPWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BPWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BPWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CD4056BPWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
						no Sb/Br)		
CD4056BPWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

TBD: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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.

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
CD4054BM96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD4055BM96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD4056BM96	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
CD4056BPWR	TSSOP	PW	16	2000	330.0	12.4	7.0	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)
CD4054BM96	SOIC	D	16	2500	333.2	345.9	28.6
CD4055BM96	SOIC	D	16	2500	333.2	345.9	28.6
CD4056BM96	SOIC	D	16	2500	333.2	345.9	28.6
CD4056BPWR	TSSOP	PW	16	2000	346.0	346.0	29.0

J (R-GDIP-T**)

14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



DIM \ PINS **	14	16	18	20
A	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC	0.300 (7,62) BSC
B MAX	0.785 (19,94)	.840 (21,34)	0.960 (24,38)	1.060 (26,92)
B MIN	—	—	—	—
C MAX	0.300 (7,62)	0.300 (7,62)	0.310 (7,87)	0.300 (7,62)
C MIN	0.245 (6,22)	0.245 (6,22)	0.220 (5,59)	0.245 (6,22)



4040083/F 03/03

- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - This package is hermetically sealed with a ceramic lid using glass frit.
 - Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
 - Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

PW (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

14 PINS SHOWN



4040064/F 01/97

- 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.
 D. Falls within JEDEC MO-153

MECHANICAL DATA

NS (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

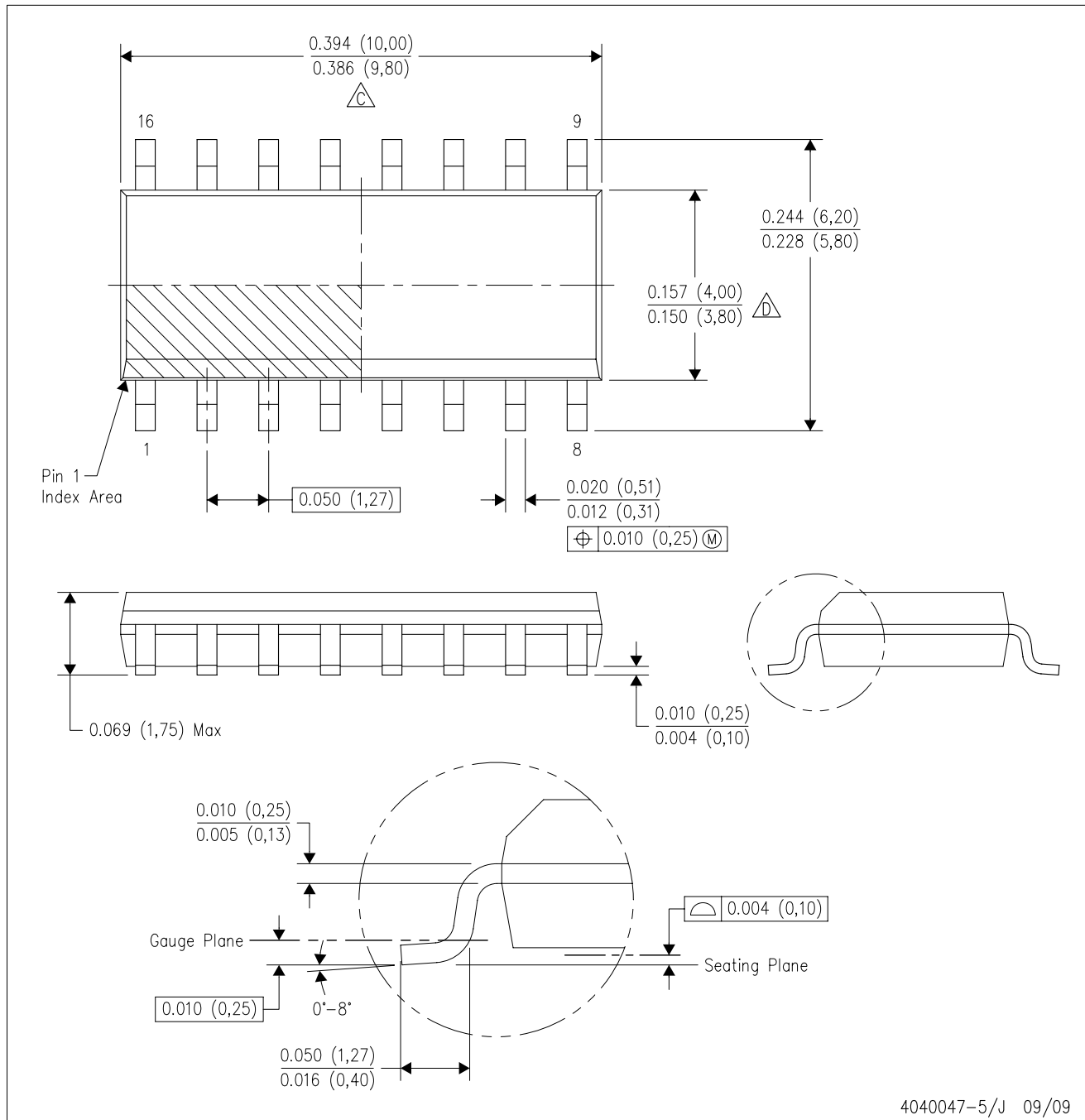
14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

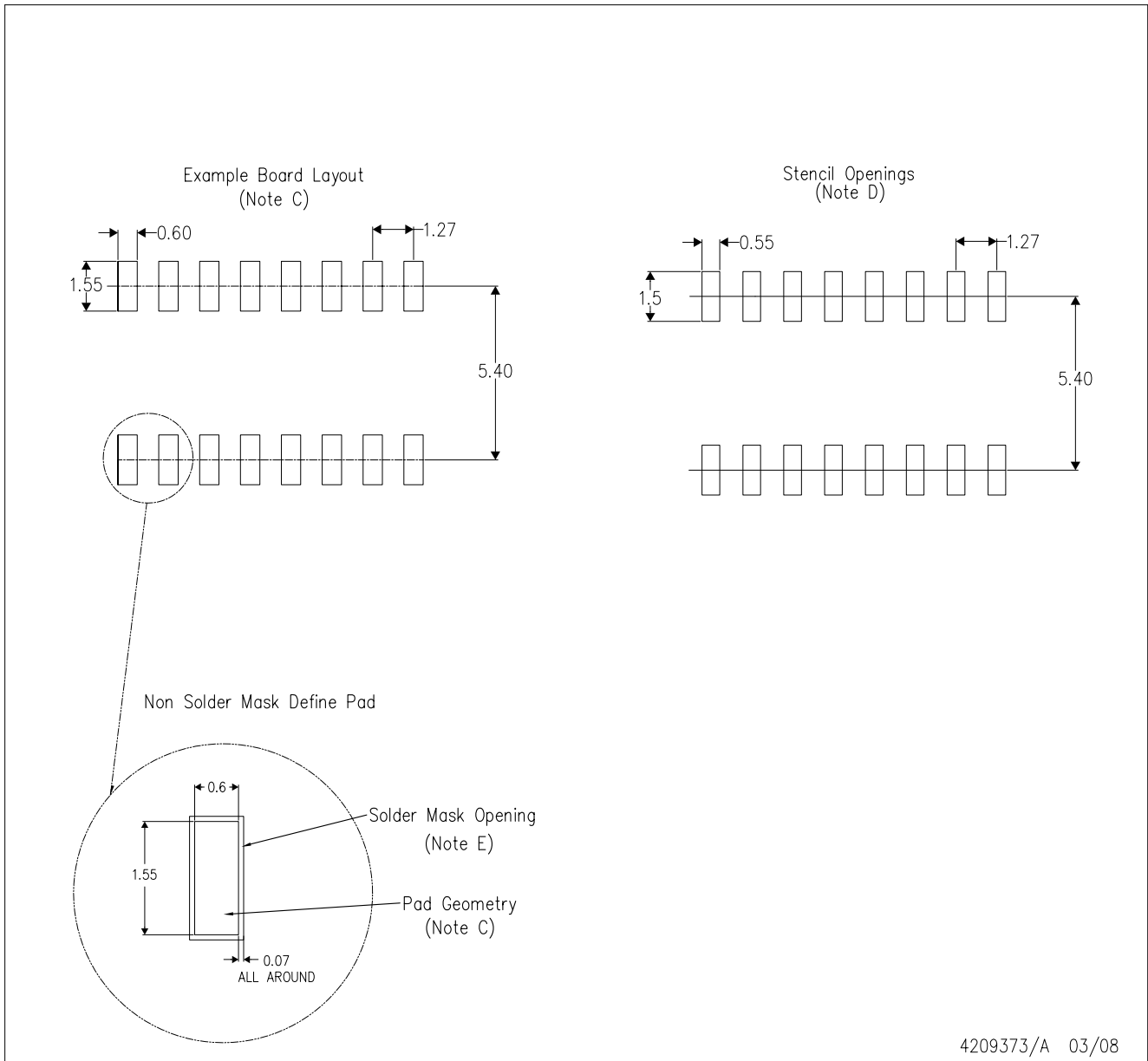
D (R-PDSO-G16)

PLASTIC SMALL-OUTLINE PACKAGE



- NOTES:
- A. All linear dimensions are in inches (millimeters).
 - B. This drawing is subject to change without notice.
 - C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 (0,15) per end.
 - D. Body width does not include interlead flash. Interlead flash shall not exceed .017 (0,43) per side.
 - E. Reference JEDEC MS-012 variation AC.

D(R-PDSO-G16)



4209373/A 03/08

- NOTES:
- A. All linear dimensions are in millimeters.
 - B. This drawing is subject to change without notice.
 - C. Refer to IPC7351 for alternate board design.
 - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
 - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



4040049/E 12/2002

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

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2009, Texas Instruments Incorporated

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View CD4056BNSR](#) on WIN SOURCE

 [Texas Instruments](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management