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# **Hex Schmitt Trigger**

The MC14584B Hex Schmitt Trigger is constructed with MOS P-channel and N-channel enhancement mode devices in a single monolithic structure. These devices find primary use where low power dissipation and/or high noise immunity is desired. The MC14584B may be used in place of the MC14069UB hex inverter for enhanced noise immunity to "square up" slowly changing waveforms.

- Supply Voltage Range = 3.0 Vdc to 18 Vdc
- Capable of Driving Two Low–power TTL Loads or One Low–power Schottky TTL Load over the Rated Temperature Range
- Double Diode Protection on All Inputs
- Can Be Used to Replace MC14069UB
- For Greater Hysteresis, Use MC14106B which is Pin–for–Pin Replacement for CD40106B and MM74Cl4

### MAXIMUM RATINGS (Voltages Referenced to V<sub>SS</sub>) (Note 2.)

Symbol	Parameter	Value	Unit
$V_{DD}$	DC Supply Voltage Range	-0.5 to +18.0	V
V <sub>in</sub> , V <sub>out</sub>	Input or Output Voltage Range (DC or Transient)	-0.5 to V <sub>DD</sub> + 0.5	V
I <sub>in</sub> , I <sub>out</sub>	Input or Output Current (DC or Transient) per Pin	±10	mA
P <sub>D</sub>	Power Dissipation, per Package (Note 3.)	500	mW
T <sub>A</sub>	Ambient Temperature Range	-55 to +125	°C
T <sub>stg</sub>	Storage Temperature Range	-65 to +150	°C
TL	Lead Temperature (8–Second Soldering)	260	°C

- Maximum Ratings are those values beyond which damage to the device may occur.
- Temperature Derating: Plastic "P and D/DW" Packages: – 7.0 mW/°C From 65°C To 125°C

This device contains protection circuitry to guard against damage due to high static voltages or electric fields. However, precautions must be taken to avoid applications of any voltage higher than maximum rated voltages to this high–impedance circuit. For proper operation,  $V_{in}$  and  $V_{out}$  should be constrained to the range  $V_{SS} \leq (V_{in} \text{ or } V_{out}) \leq V_{DD}$ .

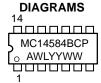
Unused inputs must always be tied to an appropriate logic voltage level (e.g., either V<sub>SS</sub> or V<sub>DD</sub>). Unused outputs must be left open.



http://onsemi.com



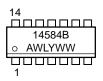
PDIP-14 P SUFFIX CASE 646



MARKING



SOIC-14 D SUFFIX CASE 751A





TSSOP-14 DT SUFFIX CASE 948G



14



SOEIAJ-14 F SUFFIX CASE 965



Α...

= Assembly Location

WL, L YY, Y = Wafer Lot = Year

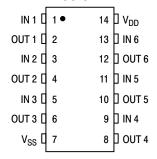
WW, W = Work Week

### ORDERING INFORMATION

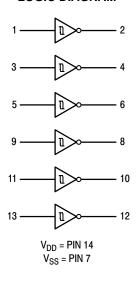
Device	Package	Shipping
MC14584BCP	PDIP-14	2000/Box
MC14584BD	SOIC-14	55/Rail
MC14584BDR2	SOIC-14	2500/Tape & Reel
MC14584BDT	TSSOP-14	96/Rail
MC14584BDTEL	TSSOP-14	2000/Tape & Reel
MC14584BF	SOEIAJ-14	See Note 1.
MC14584BFEL	SOEIAJ-14	See Note 1.

 For ordering information on the EIAJ version of the SOIC packages, please contact your local ON Semiconductor representative.

### **PIN ASSIGNMENT**

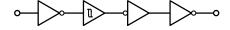


### **LOGIC DIAGRAM**



## **EQIVALENT CIRCUIT SCHEMATIC**

(1/6 OF CIRCUIT SHOWN)



## **ELECTRICAL CHARACTERISTICS** (Voltages Referenced to $V_{SS}$ )

			V <sub>DD</sub>	- 5	5°C		25°C		125	5° <b>C</b>	
Characteristic	•	Symbol	Vdc	Min	Max	Min	Typ <sup>(4.)</sup>	Max	Min	Max	Unit
Output Voltage V <sub>in</sub> = V <sub>DD</sub>	"0" Level	V <sub>OL</sub>	5.0 10 15	_ _ _	0.05 0.05 0.05	_ _ _	0 0 0	0.05 0.05 0.05	_ _ _	0.05 0.05 0.05	Vdc
V <sub>in</sub> = 0	"1" Level	V <sub>OH</sub>	5.0 10 15	4.95 9.95 14.95	_ _ _	4.95 9.95 14.95	5.0 10 15	_ _ _	4.95 9.95 14.95	_ _ _	Vdc
Output Drive Current $ (V_{OH} = 2.5 \text{ Vdc}) $ $ (V_{OH} = 4.6 \text{ Vdc}) $ $ (V_{OH} = 9.5 \text{ Vdc}) $ $ (V_{OH} = 13.5 \text{ Vdc}) $	Source	ІОН	5.0 5.0 10 15	- 3.0 - 0.64 - 1.6 - 4.2	_ _ _ _	- 2.4 - 0.51 - 1.3 - 3.4	- 4.2 - 0.88 - 2.25 - 8.8	_ _ _ _	- 1.7 - 0.36 - 0.9 - 2.4	_ _ _ _	mAdc
$(V_{OL} = 0.4 \text{ Vdc})$ $(V_{OL} = 0.5 \text{ Vdc})$ $(V_{OL} = 1.5 \text{ Vdc})$	Sink	I <sub>OL</sub>	5.0 10 15	0.64 1.6 4.2		0.51 1.3 3.4	0.88 2.25 8.8		0.36 0.9 2.4		mAdc
Input Current		l <sub>in</sub>	15	_	±0.1	_	±0.00001	±0.1	_	±1.0	μAdc
Input Capacitance (V <sub>in</sub> = 0)		C <sub>in</sub>	_	_	_	_	5.0	7.5	_	_	pF
Quiescent Current (Per Package)		I <sub>DD</sub>	5.0 10 15	_ _ _	0.25 0.5 1.0	_ _ _	0.0005 0.0010 0.0015	0.25 0.5 1.0	_ _ _	7.5 15 30	μAdc
Total Supply Current <sup>(5.)</sup> (Dynamic plus Quieso Per Package) (C <sub>L</sub> = 50 pF on all out buffers switching)	cent,	lτ	5.0 10 15			$I_T = (3$	I.8 μΑ/kHz) f 3.6 μΑ/kHz) f 5.4 μΑ/kHz) f	+ I <sub>DD</sub>			μAdc
Hysteresis Voltage		V <sub>H</sub> <sup>(7.)</sup>	5.0 10 15	0.27 0.36 0.77	1.0 1.3 1.7	0.25 0.3 0.6	0.6 0.7 1.1	1.0 1.2 1.5	0.21 0.25 0.50	1.0 1.2 1.4	Vdc
Threshold Voltage Positive–Going		V <sub>T+</sub>	5.0 10 15	1.9 3.4 5.2	3.5 7.0 10.6	1.8 3.3 5.2	2.7 5.3 8.0	3.4 6.9 10.5	1.7 3.2 5.2	3.4 6.9 10.5	Vdc
Negative–Going		V <sub>T</sub>	5.0 10 15	1.6 3.0 4.5	3.3 6.7 9.7	1.6 3.0 4.6	2.1 4.6 6.9	3.2 6.7 9.8	1.5 3.0 4.7	3.2 6.7 9.9	Vdc

<sup>4.</sup> Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

$$I_T(C_L) = I_T(50 \text{ pF}) + (C_L - 50) \text{ Vfk}$$

where:  $I_T$  is in  $\mu A$  (per package),  $C_L$  in pF,  $V = (V_{DD} - V_{SS})$  in volts, f in kHz is input frequency, and k = 0.001.

7.  $V_H = V_{T+} - V_{T-}$  (But maximum variation of  $V_H$  is specified as less than  $V_{T+max} - V_{T-min}$ ).

<sup>5.</sup> The formulas given are for the typical characteristics only at 25°C.6. To calculate total supply current at loads other than 50 pF:

# SWITCHING CHARACTERISTICS ( $C_L$ = 50 pF, $T_A$ = 25°C)

Characteristic	Symbol	V <sub>DD</sub> Vdc	Min	Typ <sup>(8.)</sup>	Max	Unit
Output Rise Time	t <sub>TLH</sub>	5.0 10 15	_ _ _	100 50 40	200 100 80	ns
Output Fall Time	t <sub>THL</sub>	5.0 10 15	_ _ _	100 50 40	200 100 80	ns
Propagation Delay Time	t <sub>PLH</sub> , t <sub>PHL</sub>	5.0 10 15	_ _ _	125 50 40	250 100 80	ns

<sup>8.</sup> Data labelled "Typ" is not to be used for design purposes but is intended as an indication of the IC's potential performance.

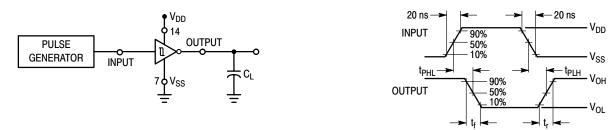
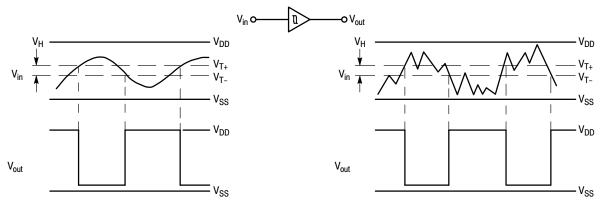


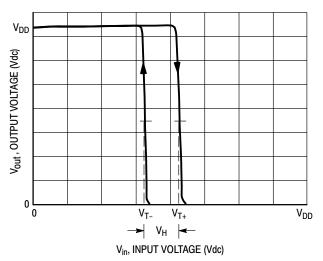
Figure 1. Switching Time Test Circuit and Waveforms



(a) Schmitt Triggers will square up inputs with slow rise and fall times.

(b) A Schmitt trigger offers maximum noise immunity in gate applications.

Figure 2. Typical Schmitt Trigger Applications

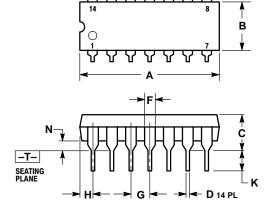


**Figure 3. Typical Transfer Characteristics** 

### **PACKAGE DIMENSIONS**

### **P SUFFIX**

PLASTIC DIP PACKAGE CASE 646-06 ISSUE M



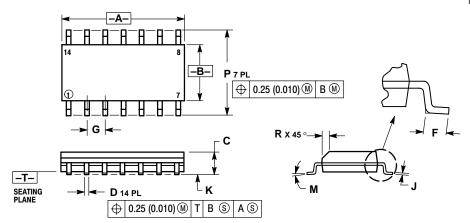
G



- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
  4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
  5. POLIMED CONDESS ORTIONAL
- 5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIM	ETERS	
DIM	MIN	MAX	MIN	MAX	
Α	0.715	0.770	18.16	18.80	
В	0.240	0.260	6.10	6.60	
С	0.145	0.185	3.69	4.69	
D	0.015	0.021	0.38	0.53	
F	0.040	0.070	1.02	1.78	
G	0.100	BSC	2.54	BSC	
Н	0.052	0.095	1.32	2.41	
J	0.008	0.015	0.20	0.38	
K	0.115	0.135	2.92	3.43	
L	0.290	0.310	7.37	7.87	
М		10°		10°	
N	0.015	0.039	0.38	1.01	

### **D SUFFIX** PLASTIC SOIC PACKAGE CASE 751A-03 ISSUE F



0.13 (0.005) M

### NOTES:

- OTES.

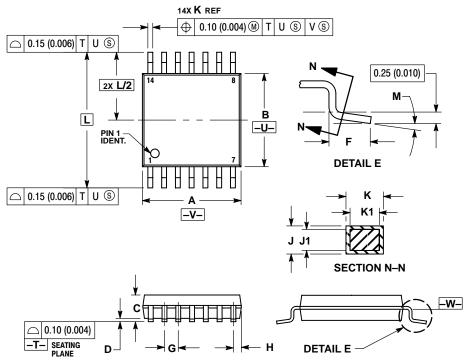
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

  2. CONTROLLING DIMENSION: MILLIMETER.
- 3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION. 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006)
- 4. MAXIMUM MOLD PHOTHUSION 0.15 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTHUSION. ALLOWABLE DAMBAR PROTHUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α	8.55	8.75	0.337	0.344
В	3.80	4.00	0.150	0.157
С	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27	BSC	0.050	BSC
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0 °	7°	0 °	7°
Р	5.80	6.20	0.228	0.244
R	0.25	0.50	0.010	0.019

### **PACKAGE DIMENSIONS**

### **DT SUFFIX** PLASTIC TSSOP PACKAGE CASE 948G-01 **ISSUE O**



### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI
- 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982. 2. CONTROLLING DIMENSION: MILLIMETER. 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED
- O.15 (0.006) PER SIDE.
   DIMENSION B DOES NOT INCLUDE
   INTERLEAD FLASH OR PROTRUSION.
   INTERLEAD FLASH OR PROTRUSION SHALL NOT.
- INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.

  5. DIMENSION K DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE K DIMENSION AT MAXIMUM MATERIAL CONDITION.

  6. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.

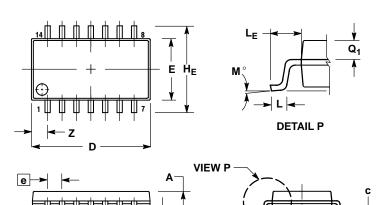
  7. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE.

DETERMINED AT DATUM PLANE -W						
	MILLIMETERS		INC	HES		
DIM	MIN	MAX	MIN	MAX		
Α	4.90	5.10	0.193	0.200		
В	4.30	4.50	0.169	0.177		
С		1.20		0.047		
D	0.05	0.15	0.002	0.006		
F	0.50	0.75	0.020	0.030		
G	0.65	BSC	0.026	BSC		
Н	0.50	0.60	0.020	0.024		
J	0.09	0.20	0.004	0.008		
J1	0.09	0.16	0.004	0.006		
K	0.19	0.30	0.007	0.012		
K1	0.19	0.25	0.007	0.010		
L	6.40 BSC		0.252	BSC		
M	0°	8°	0°	8°		

### PACKAGE DIMENSIONS

### **F SUFFIX** PLASTIC EIAJ SOIC PACKAGE CASE 965-01

**ISSUE O** 



0.10 (0.004)

### NOTES:

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982
- CONTROLLING DIMENSION: MILLIMETER.
- B. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
  TERMINAL NUMBERS ARE SHOWN FOR
- REFERENCE ONLY.

  THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) DAMBAR FAOTHOSION STALL BE USO (0.005)
  TOTAL IN EXCESS OF THE LEAD WIDTH
  DIMENSION AT MAXIMUM MATERIAL CONDITION.
  DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

	MILLIN	IETERS	INC	HES
DIM	MIN	MAX	MIN	MAX
Α		2.05		0.081
A <sub>1</sub>	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
С	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
е	1.27	BSC	0.050	BSC
HE	7.40	8.20	0.291	0.323
0.50	0.50	0.85	0.020	0.033
LE	1.10	1.50	0.043	0.059
M	0 °	10 °	0 °	10°
$Q_1$	0.70	0.90	0.028	0.035
Z		1.42		0.056

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