HD14028B

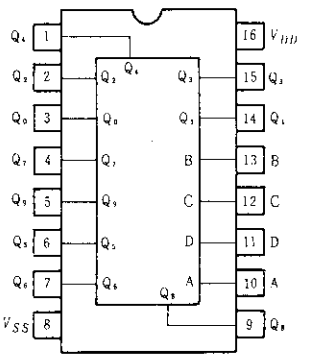
BCD-to-Decimal Decoder/ Binary-to-Octal Decoder

The HD14028B decoder is constructed so that an 8421 BCD code on the four inputs provides a decimal (one-of-ten) decoded output, while a 3-bit binary input provides a decoded octal (one-of-eight) code output with D forced to a logic "0". Expanded decoding such as binary-to-hexadecimal (one-of-16), etc., can be achieved by using other HD14028B devices. The part is useful for code conversion, address decoding, memory selection control, demultiplexing, or readout decoding.

■ FEATURES

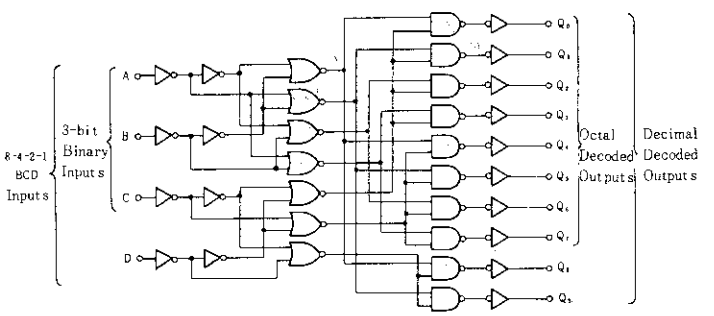
- Supply Voltage Range = 3 to 18V
- Capable of Driving One Low-power Schottky TTL Load Over the Rated Temperature Range
- Positive Logic Design
- Quiescent Current 5nA/pkg typ. @5V
- Low Outputs on All Illegal Input Combinations
- Pin-for-pin Replacement for MC14028B

■ PIN ARRANGEMENT



(Top View)

■ LOGIC DIAGRAM



■ TRUTH TABLE

Inputs				Outputs									
D	C	B	A	Q_9	Q_8	Q_7	Q_6	Q_5	Q_4	Q_3	Q_2	Q_1	Q_0
0	0	0	0	0	0	0	0	0	0	0	0	0	1
0	0	0	1	0	0	0	0	0	0	0	0	1	0
0	0	1	0	0	0	0	0	0	0	0	1	0	0
0	0	1	1	0	0	0	0	0	0	1	0	0	0
0	1	0	0	0	0	0	0	0	1	0	0	0	0
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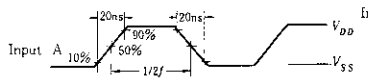
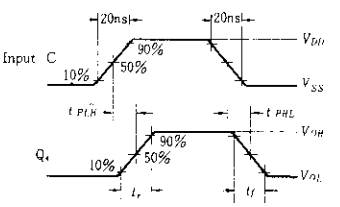
1	0	1	1	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0	0	0	0	0	0
1	1	0	1	0	0	0	0	0	0	0	0	0	0
1	1	1	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	0	0	0	0	0	0	0	0	0	0

■ DYNAMIC SIGNAL WAVEFORMS



Inputs B, C, and D switching in respect to a BCD code. All outputs connected to respective C_L loads. f in respect to a system clock.



Inputs A, B, and D low.

■ ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	V_{DD}(V)	Test Conditions	−40℃ min	−40℃ max	25℃ min	25℃ typ	25℃ max	85℃ min	85℃ max	Unit
Output Voltage	V_{OL}	5.0	$V_{in}=V_{DD}$ or 0	−	0.05	−	0	0.05	−	0.05	V
		10		−	0.05	−	0	0.05	−	0.05	
		15		−	0.05	−	0	0.05	−	0.05	
	V_{OH}	5.0	$V_{in}=0$ or V_{DD}	4.95	−	4.95	5.0	−	4.95	−	V
		10		9.95	−	9.95	10	−	9.95	−	
		15		14.95	−	14.95	15	−	14.95	−	
Input Voltage	V_{IL}	5.0	$V_{out}=4.5$ or 0.5V	−	1.5	−	2.25	1.5	−	1.5	V
		10	$V_{out}=9.0$ or 1.0V	−	3.0	−	4.50	3.0	−	3.0	
		15	$V_{out}=13.5$ or 1.5V	−	4.0	−	6.75	4.0	−	4.0	
	V_{IH}	5.0	$V_{out}=0.5$ or 4.5V	3.5	−	3.5	2.75	−	3.5	−	V
		10	$V_{out}=1.0$ or 9.0V	7.0	−	7.0	5.50	−	7.0	−	
		15	$V_{out}=1.5$ or 13.5V	11.0	−	11.0	8.25	−	11.0	−	
Output Drive Current	I_{OH}	5.0	$V_{OH}=2.5$V	−1.0	−	−0.8	−1.7	−	−0.6	−	mA
		5.0	$V_{OH}=4.6$V	−0.2	−	−0.16	−0.36	−	−0.12	−	
		10	$V_{OH}=9.5$V	−0.5	−	−0.4	−0.9	−	−0.3	−	
		15	$V_{OH}=13.5$V	−1.4	−	−1.2	−3.5	−	−1.0	−	
	I_{OL}	5.0	$V_{OL}=0.4$V	0.52	−	0.44	0.88	−	0.36	−	mA
		10	$V_{OL}=0.5$V	1.3	−	1.1	2.25	−	0.9	−	
		15	$V_{OL}=1.5$V	3.6	−	3.0	8.8	−	2.4	−	
Input Current	I_{in}	15		−	±0.3	−	±0.00001	±0.3	−	±1.0	μA
Input Capacitance	C_{in}	−	$V_{in}=0$	−	−	−	5.0	7.5	−	−	pF
Quiescent Current	I_{DD}	5.0	Zero Signal, per Package	−	20	−	0.005	20	−	150	μA
		10		−	40	−	0.010	40	−	300	
		15		−	80	−	0.015	80	−	600	
Total Supply Current*	I_T	5.0	Dynamic+I_{DD}, per Gate $C_L=50$pF, $f=1$ kHz	−	−	−	0.3	−	−	−	μA
		10		−	−	−	0.6	−	−	−	
		15		−	−	−	0.9	−	−	−	

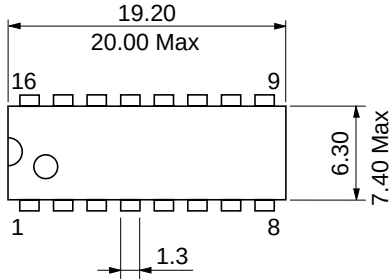
* To calculate total supply current at frequency other than 1kHz.

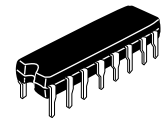
@ $V_{DD}=5.0$V $I_T=(0.3\mu A/kHz)f+I_{DD}$ @ $V_{DD}=10$V $I_T=(0.6\mu A/kHz)f+I_{DD}$ @ $V_{DD}=15$V $I_T=(0.9\mu A/kHz)f+I_{DD}$

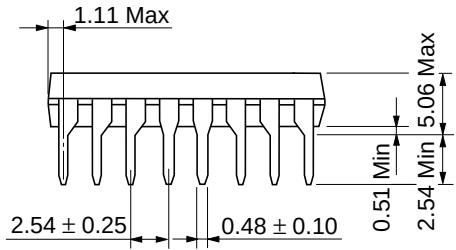
■ SWITCHING CHARACTERISTICS ($C_L=50$pF, $Ta=25$℃)

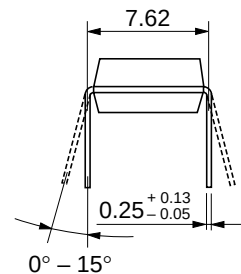
Characteristic	Symbol	V_{DD}(V)	min	typ	max	Unit
Output Rise Time	t_r	5.0	−	180	400	ns
		10	−	90	200	
		15	−	65	160	
Output Fall Time	t_f	5.0	−	150	300	ns
		10	−	70	150	
		15	−	50	100	
Propagation Delay Time	t_{PLH}	5.0	−	300	700	ns
		10	−	130	300	
		15	−	90	200	
	t_{PHL}	5.0	−	300	700	ns
		10	−	130	300	
		15	−	90	200	

Unit: mm



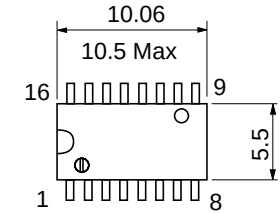


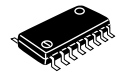


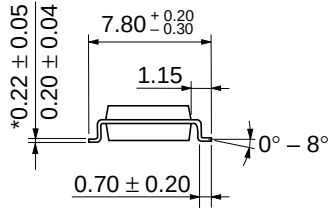


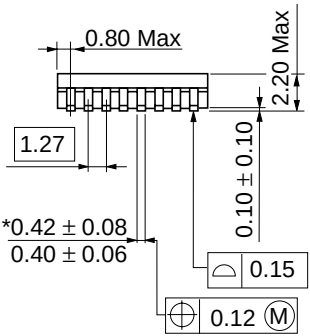
Hitachi Code	DP-16
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	1.07 g

Unit: mm





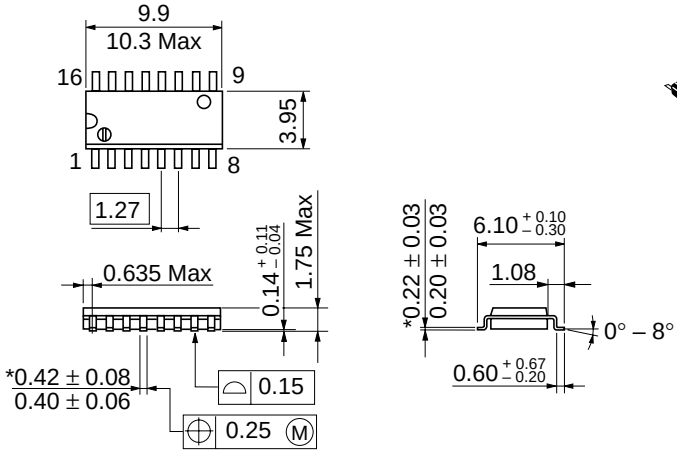


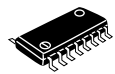


*Dimension including the plating thickness
Base material dimension

Hitachi Code	FP-16DA
JEDEC	—
EIAJ	Conforms
Weight (reference value)	0.24 g

Unit: mm





Hitachi Code	FP-16DN
JEDEC	Conforms
EIAJ	Conforms
Weight (reference value)	0.15 g

*Dimension including the plating thickness
Base material dimension

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