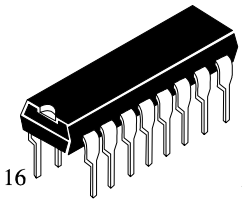
CMOS BCD-to-7-Segment Latch Decoder Drivers

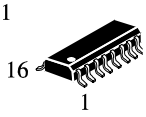
IW4511B

ICs IW4511B is usen in high-performance computing systems with low power consumption in portable measuring equipments, communication devices with power supply from telephone networks, instruments using alternative power supplies (solar batteries, thermal elements) etc.

- Standard symmetrical output characteristic
- Operating Voltage Range: 3.0 to 18 V
- 100% testing for quiescent current at 20V
- Maximum input current of 1 μA at 18 V over full package-temperature range; 100 nA at 18 V and 25°C
- Noise margin (over full package temperature range):
  1.0 V min @ 5.0 V supply
  2.0 V min @ 10.0 V supply
  2.5 V min @ 15.0 V supply



N SUFFIX
Plastic
DIP

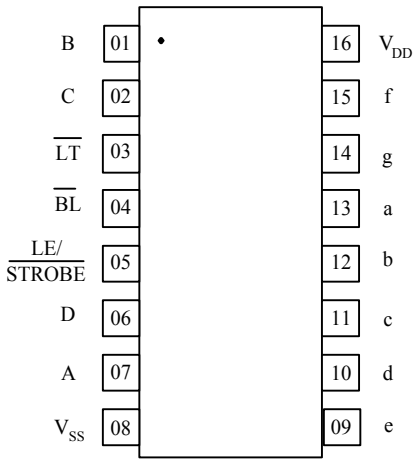


D SUFFIX
SOIC

ORDERING INFORMATION

IW4511BN Plastic DIP
IW4511BD SOIC
T_A = - 55 to 125 °C for all packages

PIN ASSIGNMENT



TRUTH TABLE

Inputs							Outputs							Display
LE	BL	LT	D	C	B	A	a	b	c	d	e	f	g	
X	X	L	X	X	X	X	H	H	H	H	H	H	H	8
X	L	H	X	X	X	X	L	L	L	L	L	L	L	blank
L	H	H	L	L	L	L	H	H	H	H	H	H	L	0
L	H	H	L	L	L	H	L	H	H	L	L	L	L	1
L	H	H	L	L	H	L	H	H	L	H	H	L	H	2
L	H	H	L	L	H	H	H	H	H	H	L	L	H	3
L	H	H	L	H	L	L	L	H	H	L	L	H	H	4
L	H	H	L	H	L	H	H	L	H	H	L	H	H	5
L	H	H	L	H	H	L	L	L	H	H	H	H	H	6
L	H	H	L	H	H	H	H	H	H	L	L	L	L	7
L	H	H	H	L	L	L	H	H	H	H	H	H	H	8
L	H	H	H	L	L	H	H	H	H	L	L	H	H	9
L	H	H	H	L	H	L	L	L	L	L	L	L	L	blank
L	H	H	H	L	H	H	L	L	L	L	L	L	L	blank
L	H	H	H	H	L	L	L	L	L	L	L	L	L	blank
L	H	H	H	H	L	H	L	L	L	L	L	L	L	blank
L	H	H	H	H	H	L	L	L	L	L	L	L	L	blank
L	H	H	H	H	H	H	L	L	L	L	L	L	L	blank
H	H	H	X	X	X	X	*							*

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* - Depends on BCD code previously, applied when LE=L

X – Don't Care

MAXIMUM RATINGS

Symbol	Parameter	Recommended operating conditions		Maximum ratings		Unit
		min	max	min	max	
V_{DD}	DC Supply Voltage	3	18	-0.5	20	V
V_I	Input Voltage Range	-	-	-0.5	V_{DD}+0.5	V
V_O	Output Voltage Range	-	-	-0.5	V_{DD}+0.5	V
I_I	DC Input Current	-	-	-	±10	mA
P_D	Power dissipation per package	-	-	-	500*	mW
P_{tot}	Power Dissipation per Output Transistor	-	-	-	100	mW

*P_D for IW4511BN for temperature range - 55 - +100 °C and for ICs IW4511BD for temperature range - 55 - +65 °C

P_D for IW4511BN derate linearity at 12 mW/°C for temperature range +100 - +125°C.

P_D for IW4511BD derate linearity at 7 mW/°C for temperature range +65- +125°C.

STATIC ELECTRICAL CHARACTERISTIC

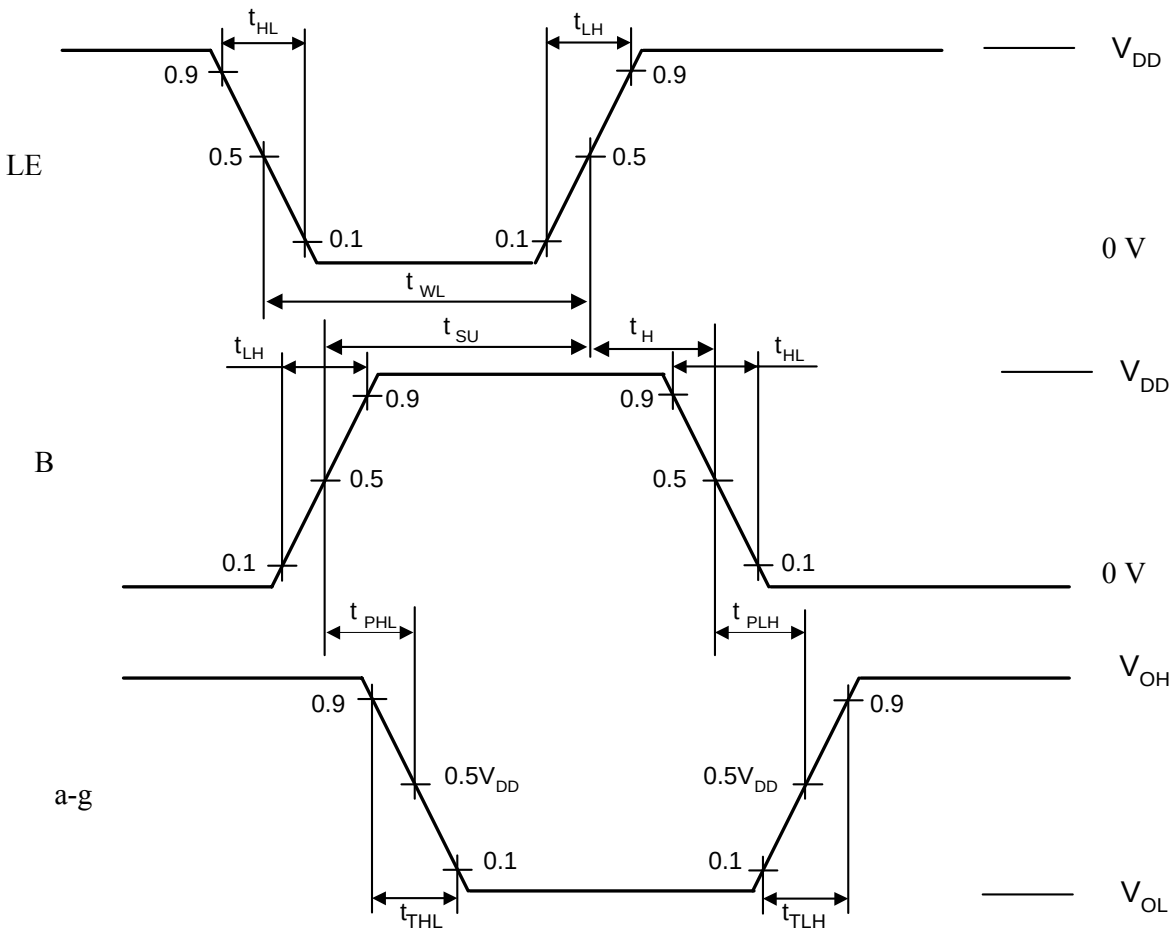
Symbol	Parameter	Test conditions	V_{DD}, V	Guaranteed Limits						Units
				-55°C		25°C		125°C		
				min	max	min	max	min	max	
V_{IH}	Minimum High-Level Input Voltage	V_O = 0.5 V or V_{DD}-1.2 V	5.0	3.5	-	3.5	-	3.5	-	V
		V_O = 1.0 V or V_{DD}-1.2 V	10	7.0	-	7.0	-	7.0	-	
		V_O = 1.5 V or V_{DD}-1.2 V	15	11	-	11	-	11	-	
V_{IL}	Maximum Low -Level Input Voltage	V_O = 0.5 V or V_{DD}-1.2 V	5.0	-	1.5	-	1.5	-	1.5	V
		V_O = 1.0 V or V_{DD}-1.2 V	10	-	3.0	-	3.0	-	3.0	
		V_O = 1.5 V or V_{DD}-1.2 V	15	-	4.0	-	4.0	-	4.0	
V_{OH}	High-Level Output Voltage	V_I = V_{SS} or V_{DD}	5.0 10 15	4.0 9.0 14.0	- - -	4.1 9.1 14.1	- - -	4.2 9.2 14.2	- - -	V
V_{OL}	Low-Level Output Voltage	V_I = V_{SS} or V_{DD}	5.0 10 15	- - -	0.05 0.05 0.05	- - -	0.05 0.05 0.05	- - -	0.05 0.05 0.05	V
I_{IL}	Low -Level Input Current	V_I = V_{SS}	18	-	-0.1	-	-0.1	-	-1.0	μA
I_{IH}	High -Level Input Current	V_I = V_{DD}	18	-	0.1	-	0.1	-	1.0	μA
I_{DD}	Quiescent Devices Current	V_I = V_{SS} or V_{DD}	5.0 10 15 20	- - - -	5.0 10 20 100	- - - -	5.0 10 20 100	- - - -	150 300 600 3000	μA
I_{OL}	Output Low (Sink) Current	V_I = V_{SS} or V_{DD} V_{OL} = 0.4 V V_{OL} = 0.5 V V_{OL} = 1.5 V	 5.0 10 15	 0.64 1.6 4.2	 - - -	 0.51 1.3 3.4	 - - -	 0.36 0.9 2.4	 - - -	mA
I_{OH}	Output High (Source) Current	V_I = V_{SS} or V_{DD} V_{OH} = 2.5 V V_{OH} = 4.6 V V_{OH} = 9.5 V V_{OH} = 13.5 V	 5.0 5.0 10 15	 -1.6 -0.46 -0.98 -3.33	 - - - -	 -1.3 -0.37 -0.8 -2.7	 - - - -	 -0.9 -0.26 -0.55 -1.9	 - - - -	mA

DYNAMIC ELECTRICAL CHARACTERISTICS (C_L=50 pF, R_L = 200 kOhm, $t_{LH} = t_{HL} \leq 20$ ns)

Symbol	Parameter	Test conditions	V_{DD}, V	Guaranteed Limits						Unit
				-55 °C		25 °C		125 °C		
				min	max	min	max	min	max	
t_{PHL}	Propagation Delay Time High-to-Low Level Input (A-D)	Time diagram on the figure	5.0 10 15	- - -	1040 420 300	- - -	1040 420 300	- - -	2080 840 600	nc
	Propagation Delay Time High-to-Low Level Input BL	Time diagram on the figure	5.0 10 15	- - -	700 350 250	- - -	700 350 250	- - -	1400 700 500	
	Propagation Delay Time High-to-Low Level Input LT	Time diagram on the figure	5.0 10 15	- - -	500 250 170	- - -	500 250 170	- - -	1000 500 340	
t_{PLH}	Propagation Delay Time Low-to-High Level Input (A-D)	Time diagram on the figure	5.0 10 15	- - -	1320 520 360	- - -	1320 520 360	- - -	2640 1040 720	nc
	Propagation Delay Time Low-to-High Level Input BL	Time diagram on the figure	5.0 10 15	- - -	800 350 300	- - -	800 350 300	- - -	1600 700 600	
	Propagation Delay Time Low-to-High Level Input LT	Time diagram on the figure	5.0 10 15	- - -	300 150 100	- - -	300 150 100	- - -	600 300 200	
t_{THL}	Transition Time High-to-Low Level	Time diagram on the figure	5.0 10 15	- - -	310 185 160	- - -	310 185 160	- - -	620 370 320	nc
t_{TLH}	Transition Time Low-to-High Level	Time diagram on the figure	5.0 10 15	- - -	80 60 50	- - -	80 60 50	- - -	160 120 100	nc
t_{SU}	Set-Up Time (A-D) as per LE	Time diagram on the figure	5.0 10 15	150 70 40	- - -	150 70 40	- - -	300 140 80	- - -	nc
t_H	Hold Time (A - D) after LE	Time diagram on the figure	5.0 10 15	0 0 0	- - -	0 0 0	- - -	0 0 0	- - -	nc
t_{WL}	LE Pulse Width	Time diagram on the figure	5.0 10 15	400 160 100	- - -	400 160 100	- - -	800 320 200	- - -	nc

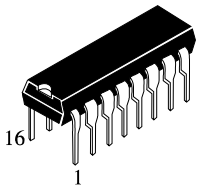
CAPACITANCE

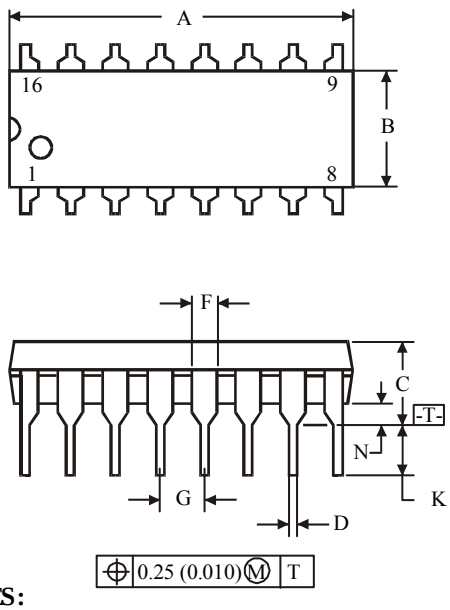
Symbol	Parameter	V_{DD}, v	Guaranteed Limits		Unit
			min	max	
C_{IN}	Input Capacitance	-	-	7.5	pF



Time diagram when taking dynamic parameters

N SUFFIX PLASTIC DIP
(MS - 001BB)



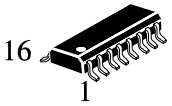


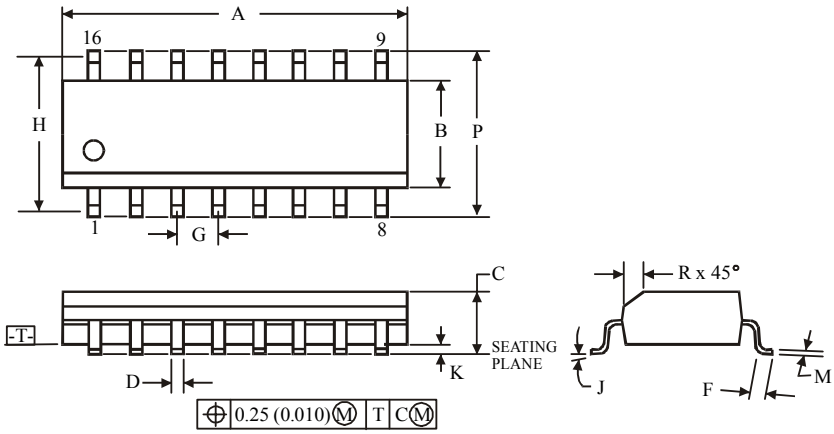
	Dimension, mm	
Symbol	**MIN**	**MAX**
A	18.67	19.69
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

1. Dimensions “A”, “B” do not include mold flash or protrusions.
   Maximum mold flash or protrusions 0.25 mm (0.010) per side.

D SUFFIX SOIC
(MS - 012AC)





	Dimension, mm	
Symbol	**MIN**	**MAX**
A	9.8	10
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

NOTES:

1. Dimensions A and B do not include mold flash or protrusion.
2. Maximum mold flash or protrusion 0.15 mm (0.006) per side
   for A; for B – 0.25 mm (0.010) per side.