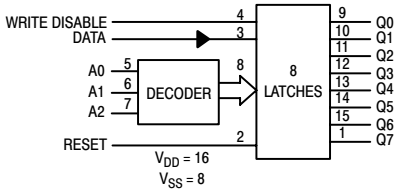
MC14099B



ELECTRICAL CHARACTERISTICS (Voltages Referenced to V_{SS})

Characteristic	Symbol	V_{DD} Vdc	−55°C Min	−55°C Max	25°C Min	25°C Typ (Note 2)	25°C Max	125°C Min	125°C Max	Unit
Output Voltage “0” Level V_{in} = V_{DD} or 0	V_{OL}	5.0	–	0.05	–	0	0.05	–	0.05	Vdc
		10	–	0.05	–	0	0.05	–	0.05	
		15	–	0.05	–	0	0.05	–	0.05	
“1” Level V_{in} = 0 or V_{DD}	V_{OH}	5.0	4.95	–	4.95	5.0	–	4.95	–	Vdc
		10	9.95	–	9.95	10	–	9.95	–	
		15	14.95	–	14.95	15	–	14.95	–	
Input Voltage “0” Level	V_{IL}									Vdc
(V_O = 4.5 or 0.5 Vdc)		5.0	–	1.5	–	2.25	1.5	–	1.5	
(V_O = 9.0 or 1.0 Vdc)		10	–	3.0	–	4.50	3.0	–	3.0	
(V_O = 13.5 or 1.5 Vdc)		15	–	4.0	–	6.75	4.0	–	4.0	
“1” Level	V_{IH}									Vdc
(V_O = 0.5 or 4.5 Vdc)		5.0	3.5	–	3.5	2.75	–	3.5	–	
(V_O = 1.0 or 9.0 Vdc)		10	7.0	–	7.0	5.50	–	7.0	–	
(V_O = 1.5 or 13.5 Vdc)		15	11	–	11	8.25	–	11	–	
Output Drive Current	I_{OH}									mAdc
(V_{OH} = 2.5 Vdc) Source		5.0	–3.0	–	–2.4	–4.2	–	–1.7	–	
(V_{OH} = 4.6 Vdc)		5.0	–0.64	–	–0.51	–0.88	–	–0.36	–	
(V_{OH} = 9.5 Vdc)		10	–1.6	–	–1.3	–2.25	–	–0.9	–	
(V_{OH} = 13.5 Vdc)		15	–4.2	–	–3.4	–8.8	–	–2.4	–	
(V_{OL} = 0.4 Vdc) Sink	I_{OL}	5.0	0.64	–	0.51	0.88	–	0.36	–	mAdc
(V_{OL} = 0.5 Vdc)		10	1.6	–	1.3	2.25	–	0.9	–	
(V_{OL} = 1.5 Vdc)		15	4.2	–	3.4	8.8	–	2.4	–	
Input Current	I_{in}	15	–	±0.1	–	±0.00001	±0.1	–	±1.0	μAdc
Input Capacitance (V_{in} = 0)	C_{in}	–	–	–	–	5.0	7.5	–	–	pF
Input Capacitance MC14599B — Data (pin 3) (V_{in} = 0)	C_{in}	–	–	–	–	15	22.5	–	–	pF
Quiescent Current (Per Package)	I_{DD}	5.0	–	5.0	–	0.005	5.0	–	150	μAdc
		10	–	10	–	0.010	10	–	300	
		15	–	20	–	0.015	20	–	600	
Total Supply Current (Notes 3 & 4) (Dynamic plus Quiescent, Per Package) (C_L = 50 pF on all outputs, all buffers switching)	I_T	5.0	I_T = (1.5 μA/kHz) f + I_{DD}							μAdc
		10	I_T = (3.0 μA/kHz) f + I_{DD}							
		15	I_T = (4.5 μA/kHz) f + I_{DD}							

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.
3. The formulas given are for the typical characteristics only at 25°C.
4. To calculate total supply current at loads other than 50 pF:

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

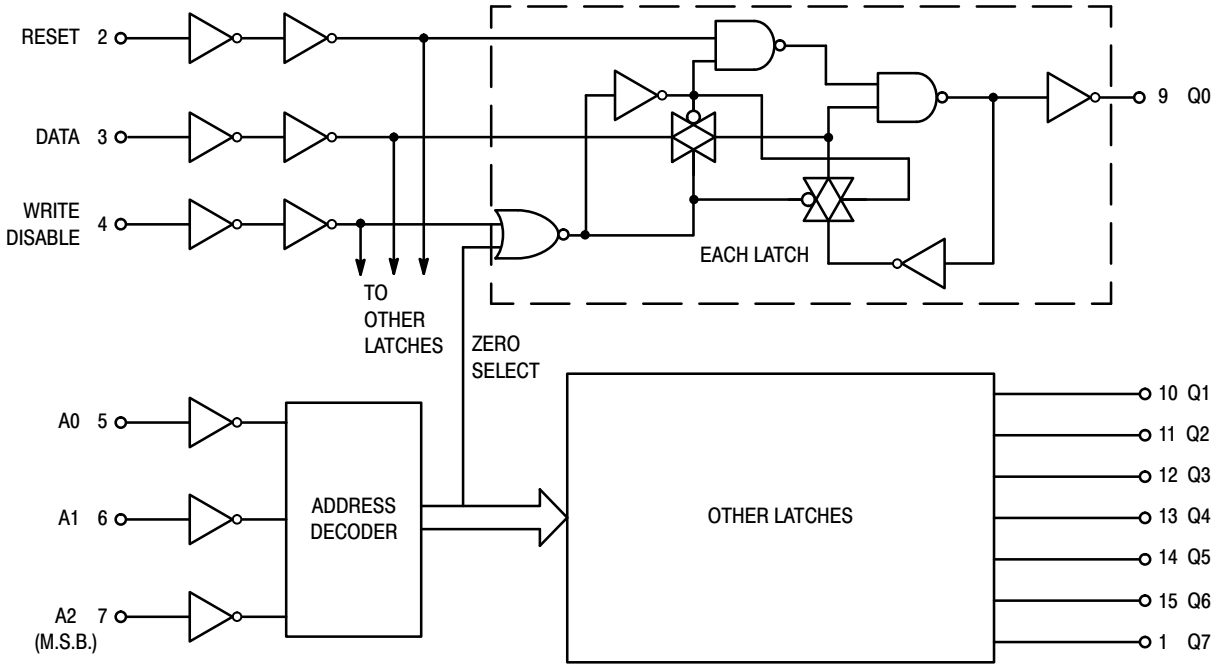
where: I_T is in μA (per package), C_L in pF, V = (V_{DD} – V_{SS}) in volts, f in kHz is input frequency, and k = 0.004.

SWITCHING CHARACTERISTICS (Note 5) (C_L = 50 pF, T_A = 25°C)

Characteristic	Symbol	V_{DD} Vdc	Min	Typ (Note 6)	Max	Unit
Output Rise and Fall Time	t_{TLH},					ns
t_{TLH}, t_{THL} = (1.35 ns/pF) C_L + 32 ns	t_{THL}	5.0	–	100	200	
t_{TLH}, t_{THL} = (0.6 ns/pF) C_L + 20 ns		10	–	50	100	
t_{TLH}, t_{THL} = (0.4 ns/pF) C_L + 20 ns		15	–	40	80	
Propagation Delay Time	t_{PHL},					ns
Data to Output Q	t_{PLH}	5.0	–	200	400	
		10	–	75	150	
		15	–	50	100	
Write Disable to Output Q		5.0	–	200	400	ns
		10	–	80	160	
		15	–	60	120	
Reset to Output Q		5.0	–	175	350	ns
		10	–	80	160	
		15	–	65	130	
CE to Output Q (MC14599B only)		5.0	–	225	450	ns
		10	–	100	200	
		15	–	75	150	
Propagation Delay Time, MC14599B only	t_{PHL},					ns
Chip Enable, Write/$\overline{\text{Read}}$ to Data	t_{PLH}	5.0	–	200	400	
		10	–	80	160	
		15	–	65	130	
Address to Data		5.0	–	200	400	ns
		10	–	90	180	
		15	–	75	150	
Pulse Widths	$t_{w(H)}$					ns
Reset	$t_{w(L)}$	5.0	150	75	–	
		10	75	40	–	
		15	50	25	–	
Write Disable		5.0	320	160	–	ns
		10	160	80	–	
		15	120	60	–	
Set Up Time	t_{su}					ns
Data to Write Disable		5.0	100	50	–	
		10	50	25	–	
		15	35	20	–	
Hold Time	t_h					ns
Write Disable to Data		5.0	150	75	–	
		10	75	40	–	
		15	50	25	–	
Set Up Time	t_{su}	5.0	100	45	–	ns
Address to Write Disable		10	80	30	–	
		15	40	10	–	
Removal Time	t_{rem}	5.0	0	– 80	–	ns
Write Disable to Address		10	0	– 40	–	
		15	0	– 40	–	

5. The formulas given are for the typical characteristics only at 25°C.
6. Data labelled “Typ” is not to be used for design purposes but is intended as an indication of the IC’s potential performance.

FUNCTION DIAGRAM



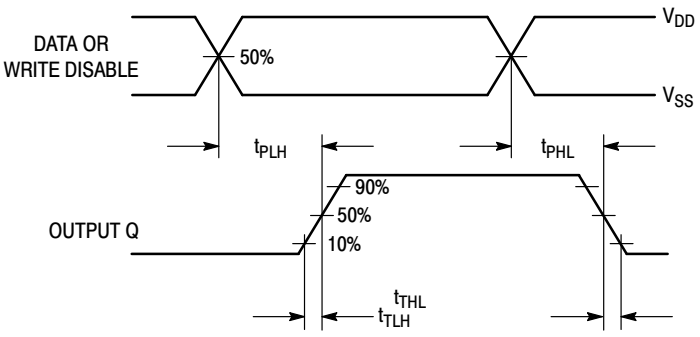
TRUTH TABLE

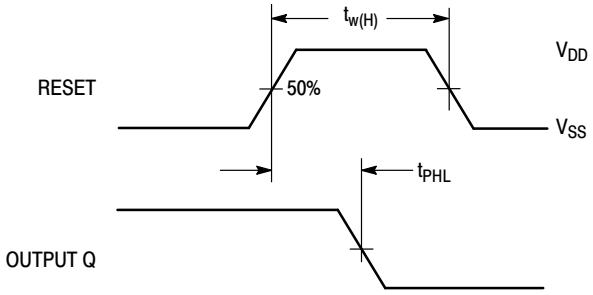
Write Disable	Reset	Addressed Latch	Unaddressed Latches
0	0	Data	Q_n*
0	1	Data	Reset †
1	0	Q_n*	Q_n*
1	1	Reset	Reset

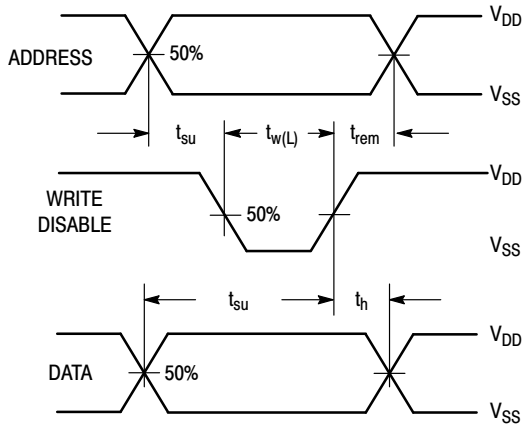
*Q_n is previous state of latch.
†Reset to zero state.

CAUTION: To avoid unintentional data changes in the latches, Write Disable must be active (high) during transitions on the address inputs A0, A1, and A2.

SWITCHING WAVEFORMS







ORDERING INFORMATION

Device	Package	Shipping†
MC14099BDWG	SOIC−16 WB (Pb−Free)	47 Units / Rail
MC14099BDWR2G	SOIC−16 WB (Pb−Free)	1000 Units / Tape & Reel
NLV14099BDWR2G*	SOIC−16 WB (Pb−Free)	1000 Units / Tape & Reel

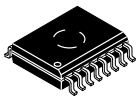
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

*NLV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q100 Qualified and PPAP Capable.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

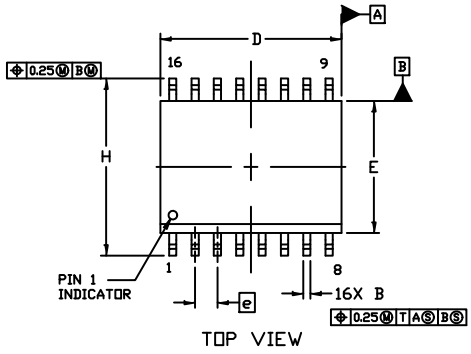
SOIC−16 WB
CASE 751G
ISSUE E

DATE 08 OCT 2021

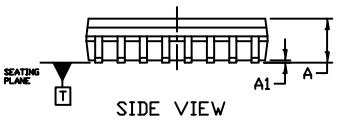


1

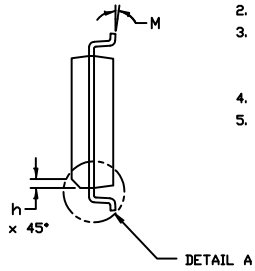
SCALE 1:1



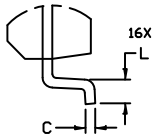
TOP VIEW



SIDE VIEW



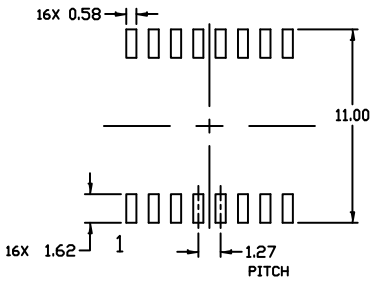
END VIEW



DETAIL A
2X SCALE

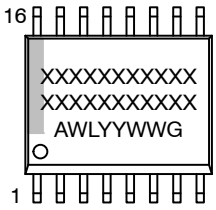
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF B DIMENSION AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION OR FLASH TO BE 0.15 PER SIDE.

	MILLIMETERS	
DIM	MIN.	MAX.
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	10.15	10.45
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.53 REF	
L	0.50	0.90
M	0°	7°



RECOMMENDED
MOUNTING FOOTPRINT

GENERIC
MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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