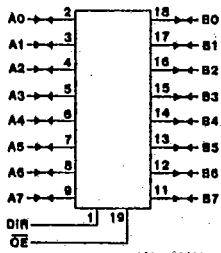


T-52-31

CD54/74AC245
CD54/74ACT245



92CS-38466
FUNCTIONAL DIAGRAM

Octal-Bus Transceiver, 3-State, Non-Inverting

Type Features:

- Buffered inputs
- Typical propagation delay:
4 ns @ $V_{CC} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$

The RCA CD54/74AC245 and CD54/74ACT245 octal-bus transceivers use the RCA ADVANCED CMOS technology. They are non-inverting 3-state bidirectional transceiver-buffers intended for two-way transmission from "A" bus to "B" bus or "B" bus to "A" bus. The logic level present on the direction input (DIR) determines the data direction. When the output enable input (\overline{OE}) is HIGH, the outputs are in the high-impedance state.

The CD74AC245 and CD74ACT245 are supplied in 20-lead dual-in-line plastic packages (E suffix) and in 20-lead dual-in-line small-outline plastic packages (M suffix). Both package types are operable over the following temperature ranges: Commercial (0 to 70°C); Industrial (-40 to $+85^\circ\text{C}$); and Extended Industrial/Military (-55 to $+125^\circ\text{C}$).

The CD54AC245 and CD54ACT245, available in chip form (H suffix), are operable over the -55 to $+125^\circ\text{C}$ temperature range.

Family Features:

- Exceeds 2-kV ESD Protection - MIL-STD-883, Method 3015
- SCR-Latch-up-resistant CMOS process and circuit design
- Speed of bipolar FAST[®]/AS/S with significantly reduced power consumption
- Balanced propagation delays
- AC types feature 1.5-V to 5.5-V operation and balanced noise immunity at 30% of the supply
- $\pm 24\text{-mA}$ output drive current
 - Fanout to 15 FAST[®] ICs
 - Drives 50-ohm transmission lines

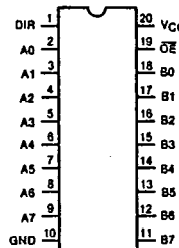
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TRUTH TABLE

| CONTROL INPUTS | | OPERATION |
|-----------------|-----|-----------------|
| \overline{OE} | DIR | |
| L | L | B DATA TO A BUS |
| L | H | A DATA TO B BUS |
| H | X | ISOLATION |

H = high level, L = low level, X = irrelevant

To prevent excess currents in the High-Z (isolation) modes, all I/O terminals should be terminated with 10K Ω to 1M Ω resistors.



92CS-38466
TERMINAL ASSIGNMENT

File Number 1907

T-52-31

CD54/74AC245
CD54/74ACT245

MAXIMUM RATINGS, Absolute-Maximum Values:

| | |
|--|---|
| DC SUPPLY-VOLTAGE (V_{CC}) | -0.5 to 6 V |
| DC INPUT DIODE CURRENT, I_{IK} (for $V_i < -0.5$ V or $V_i > V_{CC} + 0.5$ V) | ± 20 mA |
| DC OUTPUT DIODE CURRENT, I_{OK} (for $V_o < -0.5$ V or $V_o > V_{CC} + 0.5$ V) | ± 50 mA |
| DC OUTPUT SOURCE OR SINK CURRENT per Output Pin, I_o (for $V_o > -0.5$ V or $V_o < V_{CC} + 0.5$ V) | ± 50 mA |
| DC V_{CC} or GROUND CURRENT (I_{CC} or I_{GND}) | ± 100 mA* |
| POWER DISSIPATION PER PACKAGE (P_o): | |
| For $T_A = -55$ to $+100^\circ\text{C}$ (PACKAGE TYPE E) | 500 mW |
| For $T_A = +100$ to $+125^\circ\text{C}$ (PACKAGE TYPE E) | Derate Linearly at 8 mW/ $^\circ\text{C}$ to 300 mW |
| For $T_A = -55$ to $+70^\circ\text{C}$ (PACKAGE TYPE M) | 400 mW |
| For $T_A = +70$ to $+125^\circ\text{C}$ (PACKAGE TYPE M) | Derate Linearly at 6 mW/ $^\circ\text{C}$ to 70 mW |
| OPERATING-TEMPERATURE RANGE (T_A): | -55 to $+125^\circ\text{C}$ |
| STORAGE TEMPERATURE (T_{stg}): | -65 to $+150^\circ\text{C}$ |
| LEAD TEMPERATURE (DURING SOLDERING): | |
| At distance $1/16 \pm 1/32$ in. (1.59 ± 0.79 mm) from case for 10 s maximum | $+265^\circ\text{C}$ |
| Unit inserted into PC board min. thickness $1/16$ in. (1.59 mm) with solder contacting lead tips only | $+300^\circ\text{C}$ |

* For up to 4 outputs per device; add ± 25 mA for each additional output.

RECOMMENDED OPERATING CONDITIONS:

For maximum reliability, normal operating conditions should be selected so that operation is always within the following ranges:

| CHARACTERISTIC | LIMITS | | UNITS |
|--|-------------|----------------|----------------------|
| | MIN. | MAX. | |
| Supply-Voltage Range, V_{CC} *: (For T_A = Full Package-Temperature Range) AC Types ACT Types | 1.5 4.5 | 5.5 5.5 | V |
| DC Input or Output Voltage, V_i, V_o | 0 | V_{CC} | V |
| Operating Temperature, T_A | -55 | +125 | $^\circ\text{C}$ |
| Input Rise and Fall Slew Rate, dt/dv at 1.5 V to 3 V(AC Types) at 3.6 V to 5.5 V(AC Types) at 4.5 V to 5.5 V(ACT Types) | 0 0 0 | 50 20 10 | ns/V ns/V ns/V |

*Unless otherwise specified, all voltages are referenced to ground.



Technical Data

T-52-31

CD54/74AC245
CD54/74ACT245

STATIC ELECTRICAL CHARACTERISTICS: AC Series

| CHARACTERISTICS | TEST CONDITIONS | | V _{CC} (V) | AMBIENT TEMPERATURE (T _A) - °C | | | | | | UNITS | |
|--|--|------|------------------------|--|------|------------|------|-------------|------|-------|-----|
| | | | | +25 | | -40 to +85 | | -55 to +125 | | | |
| | | | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | | |
| High-Level Input Voltage V _{IH} | | | 1.5 | 1.2 | — | 1.2 | — | 1.2 | — | V | |
| | | | 3 | 2.1 | — | 2.1 | — | 2.1 | — | | |
| | | | 5.5 | 3.85 | — | 3.85 | — | 3.85 | — | | |
| Low-Level Input Voltage V _{IL} | | | 1.5 | — | 0.3 | — | 0.3 | — | 0.3 | V | |
| | | | 3 | — | 0.9 | — | 0.9 | — | 0.9 | | |
| | | | 5.5 | — | 1.65 | — | 1.65 | — | 1.65 | | |
| High-Level Output Voltage V _{OH} | V _{IH} or V _{IL} | #, * | -0.05 | 1.5 | 1.4 | — | 1.4 | — | 1.4 | V | |
| | | | -0.05 | 3 | 2.9 | — | 2.9 | — | 2.9 | | |
| | | | -0.05 | 4.5 | 4.4 | — | 4.4 | — | 4.4 | | |
| | | | -4 | 3 | 2.58 | — | 2.48 | — | 2.4 | | |
| | | | -24 | 4.5 | 3.94 | — | 3.8 | — | 3.7 | | |
| | | | -75 | 5.5 | — | — | 3.85 | — | — | | |
| Low-Level Output Voltage V _{OL} | V _{IH} or V _{IL} | #, * | 0.05 | 1.5 | — | 0.1 | — | 0.1 | — | V | |
| | | | 0.05 | 3 | — | 0.1 | — | 0.1 | — | | |
| | | | 0.05 | 4.5 | — | 0.1 | — | 0.1 | — | | |
| | | | 12 | 3 | — | 0.36 | — | 0.44 | — | | 0.5 |
| | | | 24 | 4.5 | — | 0.36 | — | 0.44 | — | | 0.5 |
| | | | 75 | 5.5 | — | — | — | 1.65 | — | | — |
| Input Leakage Current I _I | V _{CC} or GND | | 5.5 | — | ±0.1 | — | ±1 | — | ±1 | μA | |
| | | | | | | | | | | | |
| 3-State Leakage Current I _{OZ} | V _{IH} or V _{IL} V _O = V _{CC} or GND | | 5.5 | — | ±0.5 | — | ±5 | — | ±10 | μA | |
| | | | | | | | | | | | |
| Quiescent Supply Current, MSI I _{CC} | V _{CC} or GND | 0 | 5.5 | — | 8 | — | 80 | — | 160 | μA | |
| | | | | | | | | | | | |

#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.

* Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

T-52-31

CD54/74AC245
CD54/74ACT245

STATIC ELECTRICAL CHARACTERISTICS: ACT Series

| CHARACTERISTICS | TEST CONDITIONS | V_{CC} (V) | AMBIENT TEMPERATURE (T _J) - °C | | | | | | UNITS | | |
|---|-----------------|---|--|------------|------------|------|-------------|------|-------|------|----|
| | | | +25 | | -40 to +85 | | -55 to +125 | | | | |
| | | | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | | | |
| High-Level Input Voltage | V_{IH} | | 4.5 to 5.5 | 2 | — | 2 | — | 2 | — | V | |
| Low-Level Input Voltage | V_{IL} | | 4.5 to 5.5 | — | 0.8 | — | 0.8 | — | 0.8 | V | |
| High-Level Output Voltage | V_{OH} | V_{IH} or V_{IL} #, * | -0.05 | 4.5 | 4.4 | — | 4.4 | — | 4.4 | — | V |
| | | | -24 | 4.5 | 3.94 | — | 3.8 | — | 3.7 | — | |
| | | | -75 | 5.5 | — | — | 3.85 | — | — | — | |
| | | | -50 | 5.5 | — | — | — | — | 3.85 | — | |
| Low-Level Output Voltage | V_{OL} | V_{IH} or V_{IL} #, * | 0.05 | 4.5 | — | 0.1 | — | 0.1 | — | 0.1 | V |
| | | | 24 | 4.5 | — | 0.36 | — | 0.44 | — | 0.5 | |
| | | | 75 | 5.5 | — | — | — | 1.65 | — | — | |
| | | | 50 | 5.5 | — | — | — | — | — | 1.65 | |
| Input Leakage Current | I_i | V_{CC} or GND | | 5.5 | — | ±0.1 | — | ±1 | — | ±1 | μA |
| 3-State Leakage Current | I_{OZ} | V_{IH} or V_{IL} $V_o = V_{CC}$ or GND | | 5.5 | — | ±0.5 | — | ±5 | — | ±10 | μA |
| Quiescent Supply Current, MSI | I_{CC} | V_{CC} or GND | 0 | 5.5 | — | 8 | — | 80 | — | 160 | μA |
| Additional Quiescent Supply Current per Input Pin TTL Inputs High 1 Unit Load | ΔI_{CC} | $V_{CC}-2.1$ | | 4.5 to 5.5 | — | 2.4 | — | 2.8 | — | 3 | mA |



#Test one output at a time for a 1-second maximum duration. Measurement is made by forcing current and measuring voltage to minimize power dissipation.
*Test verifies a minimum 50-ohm transmission-line-drive capability at +85°C, 75 ohms at +125°C.

ACT INPUT LOADING TABLE

| INPUT | UNIT LOADS* |
|-----------------|-------------|
| An, Bn | 0.83 |
| \overline{OE} | 0.64 |
| DIR | 0.15 |

*Unit load is ΔI_{CC} limit specified in Static Characteristics Chart, e.g., 2.4 mA max. @ 25°C.

T-52-31

Technical Data

CD54/74AC245
CD54/74ACT245

SWITCHING CHARACTERISTICS: AC Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

| CHARACTERISTICS | SYMBOL | V_{CC} (V) | AMBIENT TEMPERATURE (T_A) - °C | | | | UNITS |
|--|----------------------------|-----------------|------------------------------------|------|-------------|------|-------|
| | | | -40 to +85 | | -55 to +125 | | |
| | | | MIN. | MAX. | MIN. | MAX. | |
| Propagation Delays: Data to Output | t_{PLH} | 1.5 | — | 96 | — | 106 | ns |
| | t_{PHL} | 3.3* | 3.2 | 10.8 | 3 | 11.9 | |
| Output Disable to Output | t_{PLZ} | 1.5 | — | 159 | — | 175 | ns |
| | t_{PHZ} | 3.3 | 4.7 | 15.9 | 4.4 | 17.5 | |
| Output Enable to Output | t_{PZL} | 1.5 | — | 159 | — | 175 | ns |
| | t_{PZH} | 3.3 | 5.6 | 19 | 5.3 | 21 | |
| Power Dissipation Capacitance | $C_{PD\&}$ | — | 57 Typ. | | 57 Typ. | | pF |
| Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching) | V_{OHV} See Fig. 1 | 5 | 4 Typ. @ 25°C | | | | V |
| Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching) | V_{OLP} See Fig. 1 | 5 | 1 Typ. @ 25°C | | | | V |
| Input Capacitance | C_i | — | — | 10 | — | 10 | pF |
| 3-State Output Capacitance | C_o | — | — | 15 | — | 15 | pF |

SWITCHING CHARACTERISTICS: ACT Series; $t_r, t_f = 3 \text{ ns}$, $C_L = 50 \text{ pF}$

| CHARACTERISTICS | SYMBOL | V_{CC} (V) | AMBIENT TEMPERATURE (T_A) - °C | | | | UNITS |
|--|----------------------------|-----------------|------------------------------------|------|-------------|------|-------|
| | | | -40 to +85 | | -55 to +125 | | |
| | | | MIN. | MAX. | MIN. | MAX. | |
| Propagation Delays: Data to Output | t_{PLH} | 5† | 2.7 | 9.1 | 2.5 | 10 | ns |
| | t_{PHL} | | | | | | |
| Output Disable to Output | t_{PLZ} | 5 | 3.7 | 12.7 | 3.5 | 14 | ns |
| | t_{PHZ} | | | | | | |
| Output Enable to Output | t_{PZH} | 5 | 3.8 | 13.1 | 3.6 | 14.4 | ns |
| | t_{PZL} | | | | | | |
| Power Dissipation Capacitance | $C_{PD\&}$ | — | 57 Typ. | | 57 Typ. | | pF |
| Min. (Valley) V_{OH} During Switching of Other Outputs (Output Under Test Not Switching) | V_{OHV} See Fig. 1 | 5 | 4 Typ. @ 25°C | | | | V |
| Max. (Peak) V_{OL} During Switching of Other Outputs (Output Under Test Not Switching) | V_{OLP} See Fig. 1 | 5 | 1 Typ. @ 25°C | | | | V |
| Input Capacitance | C_i | — | — | 10 | — | 10 | pF |
| 3-State Output Capacitance | C_o | — | — | 15 | — | 15 | pF |

*3.3 V: min. I_s @ 3.6 V
max. I_s @ 3 V

†5 V: min. I_s @ 5.5 V
max. I_s @ 4.5 V

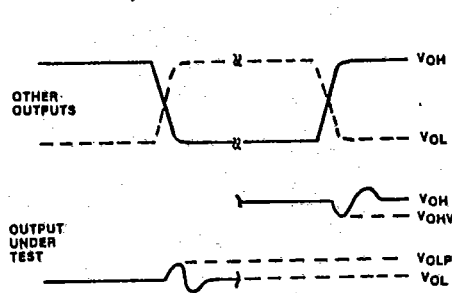
$\&C_{PD}$ is used to determine the dynamic power consumption, per channel.

For AC series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L)$

For ACT series: $P_D = V_{CC}^2 f_i (C_{PD} + C_L) + V_{CC} \Delta I_{CC}$ where f_i = input frequency
 C_L = output load capacitance
 V_{CC} = supply voltage.

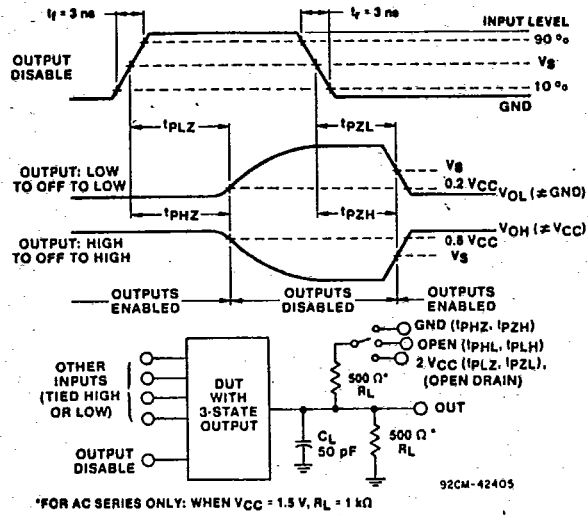
Technical Data
CD54/74AC245
CD54/74ACT245
 T-52-31

PARAMETER MEASUREMENT INFORMATION



- NOTES:
1. VOHV AND VOLP ARE MEASURED WITH RESPECT TO A GROUND REFERENCE NEAR THE OUTPUT UNDER TEST.
 2. INPUT PULSES HAVE THE FOLLOWING CHARACTERISTICS:
 PRR ≤ 1 MHz, $t_r = 3$ ns, $t_f = 3$ ns, SKEW 1 ns.
 3. R.F. FIXTURE WITH 700-MHz DESIGN RULES REQUIRED.
 IC SHOULD BE SOLDERED INTO TEST BOARD AND BYPASSED WITH 0.1 μF CAPACITOR. SCOPE AND PROBES REQUIRE 700-MHz BANDWIDTH.

92CS-42405

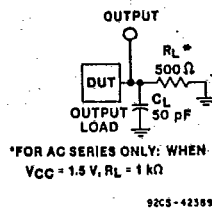


*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5$ V, $R_L = 1$ kΩ

92CM-42405

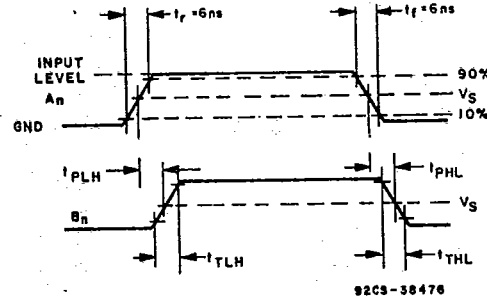
Fig. 1 - Simultaneous switching transient waveforms.

Fig. 2 - Three-state propagation delay times and test circuit.



*FOR AC SERIES ONLY: WHEN $V_{CC} = 1.5$ V, $R_L = 1$ kΩ

92CS-42389



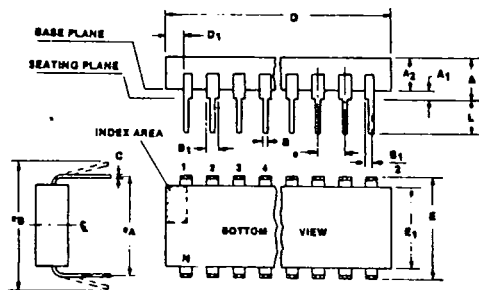
92CS-38476

Fig. 3 - Propagation delay times and test circuit.

| | CD54/74AC | CD54/74ACT |
|---------------------------------|--------------|--------------|
| Input Level | V_{CC} | 3 V |
| Input Switching Voltage, V_s | $0.5 V_{CC}$ | 1.5 V |
| Output Switching Voltage, V_s | $0.5 V_{CC}$ | $0.5 V_{CC}$ |

Dual-In-Line Plastic Packages

T-90-20



(E) Suffix (JEDEC MS-001-AC)
14-Lead Dual-In-Line Plastic Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|-------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | — | 0.210 | — | 5.33 | 9 |
| A ₁ | 0.015 | — | 0.39 | — | 9 |
| A ₂ | 0.115 | 0.195 | 2.93 | 4.95 | |
| B | 0.014 | 0.022 | 0.356 | 0.558 | |
| B ₁ | 0.045 | 0.070 | 1.15 | 1.77 | 3 |
| C | 0.008 | 0.015 | 0.204 | 0.381 | |
| D | 0.725 | 0.795 | 18.42 | 20.19 | 4 |
| D ₁ | 0.005 | — | 0.13 | — | 12 |
| E | 0.300 | 0.325 | 7.62 | 8.25 | 5 |
| E ₁ | 0.240 | 0.280 | 6.10 | 7.11 | 6, 7 |
| e | 0.100 BSC | | 2.54 BSC | | 8 |
| e _A | 0.300 BSC | | 7.62 BSC | | 9 |
| e _B | — | 0.430 | — | 10.92 | 10 |
| L | 0.115 | 0.160 | 2.93 | 4.06 | 9 |
| N | 14 | | 14 | | 11 |

92CS-39901

(E) Suffix (JEDEC MS-001-AA)
16-Lead Dual-In-Line Plastic Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|-------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | — | 0.210 | — | 5.33 | 9 |
| A ₁ | 0.015 | — | 0.39 | — | 9 |
| A ₂ | 0.115 | 0.195 | 2.93 | 4.95 | |
| B | 0.014 | 0.022 | 0.356 | 0.558 | |
| B ₁ | 0.045 | 0.070 | 1.15 | 1.77 | 3 |
| C | 0.008 | 0.015 | 0.204 | 0.381 | |
| D | 0.745 | 0.840 | 18.93 | 21.33 | 4 |
| D ₁ | 0.005 | — | 0.13 | — | 12 |
| E | 0.300 | 0.325 | 7.62 | 8.25 | 5 |
| E ₁ | 0.240 | 0.280 | 6.10 | 7.11 | 6, 7 |
| e | 0.100 BSC | | 2.54 BSC | | 8 |
| e _A | 0.300 BSC | | 7.62 BSC | | 9 |
| e _B | — | 0.430 | — | 10.92 | 10 |
| L | 0.115 | 0.160 | 2.93 | 4.06 | 9 |
| N | 16 | | 16 | | 11 |

92CS-39900

Notes:

1. Refer to JEDEC Publication No. 95 JEDEC Registered and Standard Outlines for Solid State Products, for rules and general information concerning registered and standard outlines, in Section 2.2.
2. Protrusions (flash) on the base plane surface shall not exceed 0.010 in. (0.25 mm).
3. The dimension shown is for full leads. "Half" leads are optional at lead positions
 $1, N, \frac{N}{2}, \frac{N}{2} + 1.$
4. Dimension D does not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.010 in. (0.25 mm).
5. E is the dimension to the outside of the leads and is measured with the leads perpendicular to the base plane (zero lead spread).
6. Dimension E₁ does not include mold flash or protrusions.
7. Package body and leads shall be symmetrical around center line shown in end view.
8. Lead spacing e shall be non-cumulative and shall be measured at the lead tip. This measurement shall be made before insertion into gauges, boards or sockets.
9. This is a basic installed dimension. Measurement shall be made with the device installed in the seating plane gauge (JEDEC Outline No. GS-3, seating plane gauge). Leads shall be in true position within 0.010 in. (0.25 mm) diameter for dimension e_A.
10. e_B is the dimension to the outside of the leads and is measured at the lead tips before the device is installed. Negative lead spread is not permitted.
11. N is the maximum number of lead positions.
12. Dimension D₁ at the left end of the package must equal dimension D₁ at the right end of the package within 0.030 in. (0.76 mm).
13. For automatic insertion, any raised irregularity on the top surface (step, mesa, etc.) shall be symmetrical about the lateral and longitudinal package centerlines.

(E) Suffix (JEDEC MS-001-AE)
20-Lead Dual-In-Line Plastic Package

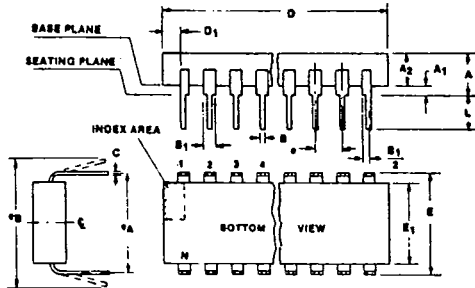
| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|-------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | — | 0.210 | — | 5.33 | 9 |
| A ₁ | 0.015 | — | 0.39 | — | 9 |
| A ₂ | 0.115 | 0.195 | 2.93 | 4.95 | |
| B | 0.014 | 0.022 | 0.356 | 0.558 | |
| B ₁ | 0.045 | 0.070 | 1.15 | 1.77 | 3 |
| C | 0.008 | 0.015 | 0.204 | 0.381 | |
| D | 0.925 | 1.060 | 23.5 | 26.9 | 4 |
| D ₁ | 0.005 | — | 0.13 | — | 12 |
| E | 0.300 | 0.325 | 7.62 | 8.25 | 5 |
| E ₁ | 0.240 | 0.280 | 6.10 | 7.11 | 6, 7 |
| e | 0.100 BSC | | 2.54 BSC | | 8 |
| e _A | 0.300 BSC | | 7.62 BSC | | 9 |
| e _B | — | 0.430 | — | 10.92 | 10 |
| L | 0.115 | 0.160 | 2.93 | 4.06 | 9 |
| N | 20 | | 20 | | 11 |

92CS-39997

Dual-In-Line Plastic Packages

T-90-20

(E) Suffix (JEDEC MS-001-AF)
24-Lead Dual-In-Line Plastic Package



| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|-------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | — | 0.210 | — | 5.33 | 9 |
| A ₁ | 0.015 | — | 0.39 | — | 9 |
| A ₂ | 0.115 | 0.195 | 2.93 | 4.95 | |
| B | 0.014 | 0.022 | 0.356 | 0.558 | |
| B ₁ | 0.045 | 0.070 | 1.15 | 1.77 | 3 |
| C | 0.008 | 0.015 | 0.204 | 0.381 | |
| D | 1.125 | 1.275 | 28.6 | 32.3 | 4 |
| D ₁ | 0.005 | — | 0.13 | — | 12 |
| E | 0.300 | 0.325 | 7.62 | 8.25 | 5 |
| E ₁ | 0.240 | 0.280 | 6.10 | 7.11 | 6, 7 |
| e | 0.100 BSC | | 2.54 BSC | | 8 |
| e _A | 0.300 BSC | | 7.62 BSC | | 9 |
| e _B | — | 0.430 | — | 10.92 | 10 |
| L | 0.115 | 0.160 | 2.93 | 4.06 | 9 |
| N | 24 | | 24 | | 11 |

92CS-39943

Notes:

1. Refer to JEDEC Publication No. 95 JEDEC Registered and Standard Outlines for Solid State Products, for rules and general information concerning registered and standard outlines, in Section 2.2.
2. Protrusions (flash) on the base plane surface shall not exceed 0.010 in. (0.25 mm).
3. The dimension shown is for full leads. "Half" leads are optional at lead positions

$$1, N, \frac{N}{2}, \frac{N}{2} + 1.$$
4. Dimension D does not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.010 in. (0.25 mm).
5. E is the dimension to the outside of the leads and is measured with the leads perpendicular to the base plane (zero lead spread).
6. Dimension E₁ does not include mold flash or protrusions.
7. Package body and leads shall be symmetrical around

center line shown in end view.

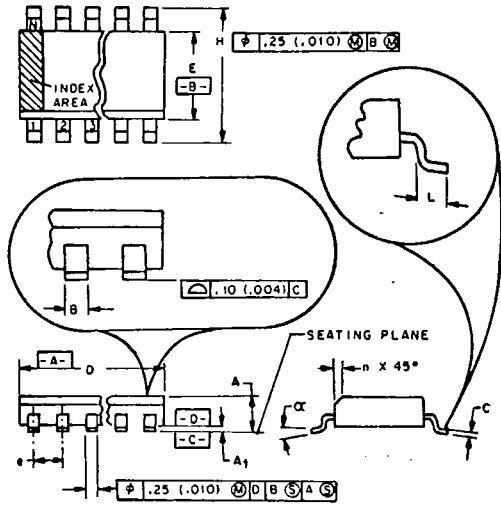
8. Lead spacing e shall be non-cumulative and shall be measured at the lead tip. This measurement shall be made before insertion into gauges, boards or sockets.
9. This is a basic installed dimension. Measurement shall be made with the device installed in the seating plane gauge (JEDEC Outline No. GS-3, seating plane gauge). Leads shall be in true position within 0.010 in. (0.25 mm) diameter for dimension e_A.
10. e_B is the dimension to the outside of the leads and is measured at the lead tips before the device is installed. Negative lead spread is not permitted.
11. N is the maximum number of lead positions.
12. Dimension D₁ at the left end of the package must equal dimension D₁ at the right end of the package within 0.030 in. (0.76 mm).
13. For automatic insertion, any raised irregularity on the top surface (step, mesa, etc.) shall be symmetrical about the lateral and longitudinal package centerlines.



Dimensional Outlines

Dual-In-Line Small-Outline Plastic Packages

T-90-20



NOTES:

1. Refer to applicable symbol list.
2. Dimensioning and tolerancing per ANSI Y14.5M-1982.
3. "D" is a reference datum.
4. "A" and "B" are reference datums and do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15 mm (0.006 in.).
5. The chamfer on the body is optional. If it is not present, a visual index feature must be located within the cross-hatched area.
6. "L" is the length of terminal for soldering to a substrate.
7. "N" is the number of terminal positions.
8. Terminal numbers are shown for reference only.
9. Controlling dimensions: MILLIMETERS.

M Suffix (JEDEC MS-012AB)
14-Lead Dual-In-Line Small-Outline (SO) Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|--------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 0.0532 | 0.0688 | 1.35 | 1.75 | |
| A ₁ | 0.0040 | 0.0098 | 0.10 | 0.25 | |
| B | 0.0138 | 0.020 | 0.35 | 0.508 | |
| C | 0.0075 | 0.0098 | 0.19 | 0.25 | |
| D | 0.3367 | 0.3444 | 8.55 | 8.75 | 4 |
| E | 0.1497 | 0.1574 | 3.80 | 4.00 | 4 |
| e | 0.050 BSC | | 1.27 BSC | | |
| H | 0.2284 | 0.2440 | 5.80 | 6.20 | |
| h | 0.0099 | 0.0196 | 0.25 | 0.50 | 5 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | 6 |
| N | 14 | | 14 | | 7 |
| α | 0° 8° | | 0° 8° | | |

Notes: 1, 2, 3, 8, 9

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M Suffix (JEDEC MS-012AC)
16-Lead Dual-In-Line Small-Outline (SO) Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|--------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 0.0532 | 0.0688 | 1.35 | 1.75 | |
| A ₁ | 0.0040 | 0.0098 | 0.10 | 0.25 | |
| B | 0.0138 | 0.020 | 0.35 | 0.508 | |
| C | 0.0075 | 0.0098 | 0.19 | 0.25 | |
| D | 0.3859 | 0.3937 | 9.80 | 10.00 | 4 |
| E | 0.1497 | 0.1574 | 3.80 | 4.00 | 4 |
| e | 0.050 BSC | | 1.27 BSC | | |
| H | 0.2284 | 0.2440 | 5.80 | 6.20 | |
| h | 0.0099 | 0.0196 | 0.25 | 0.50 | 5 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | 6 |
| N | 16 | | 16 | | 7 |
| α | 0° 8° | | 0° 8° | | |

Notes: 1, 2, 3, 8, 9

92CS-38925R2

M Suffix (JEDEC MS-013AC)
20-Lead Dual-In-Line Small-Outline (SO) Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|--------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 0.0926 | 0.1043 | 2.35 | 2.65 | |
| A ₁ | 0.0040 | 0.0118 | 0.10 | 0.30 | |
| B | 0.0138 | 0.020 | 0.35 | 0.508 | |
| C | 0.0091 | 0.0125 | 0.23 | 0.32 | |
| D | 0.4861 | 0.5118 | 12.60 | 13.00 | 4 |
| E | 0.2914 | 0.2992 | 7.40 | 7.60 | 4 |
| e | 0.050 BSC | | 1.27 BSC | | |
| H | 0.394 | 0.419 | 10.00 | 10.65 | |
| h | 0.010 | 0.029 | 0.25 | 0.75 | 5 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | 6 |
| N | 20 | | 20 | | 7 |
| α | 0° 8° | | 0° 8° | | |

Notes: 1, 2, 3, 8, 9

92CS-38926R2

M Suffix (JEDEC MS-013AD)
24-Lead Dual-In-Line Small-Outline (SO) Package

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------------|-----------|--------|-------------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 0.0926 | 0.1043 | 2.35 | 2.65 | |
| A ₁ | 0.0040 | 0.0118 | 0.10 | 0.30 | |
| B | 0.0138 | 0.020 | 0.35 | 0.508 | |
| C | 0.0091 | 0.0125 | 0.23 | 0.32 | |
| D | 0.5985 | 0.6141 | 15.20 | 15.60 | 4 |
| E | 0.2914 | 0.2992 | 7.40 | 7.60 | 4 |
| e | 0.050 BSC | | 1.27 BSC | | |
| H | 0.394 | 0.419 | 10.00 | 10.65 | |
| h | 0.010 | 0.029 | 0.25 | 0.75 | 5 |
| L | 0.016 | 0.050 | 0.40 | 1.27 | 6 |
| N | 24 | | 24 | | 7 |
| α | 0° 8° | | 0° 8° | | |

Notes: 1, 2, 3, 8, 9

92CS-39037R2