# ULx2803, ULx2804, ULx2823, and ULx2824

*High Voltage High Current Darlington Arrays*

## Discontinued Product

These parts are no longer in production  The device should not be purchased for new design applications. Samples are no longer available.

Date of status change: October 31, 2005

**Recommended Substitutions:**

NOTE: For detailed information on purchasing options, contact your local Allegro field applications engineer or sales representative.

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## DEVICE PART NUMBER DESIGNATION

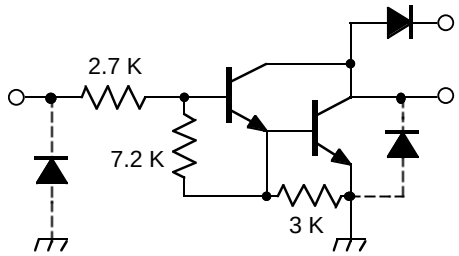
| $V_{CE(MAX)}$ | 50 V | 95 V |
|---|---|---|
| $I_{C(MAX)}$ | 500 mA | 500 mA |
| **Logic** | **Part Number** | |
| 5V<br>TTL, CMOS | ULN2803A*<br>ULN2803LW* | ULN2823A*<br>ULN2823LW |
| 6-15 V<br>CMOS, PMOS | ULN2804A*<br>ULN2804LW* | ULN2824A*<br>ULN2824LW |

*Also available for operation between -40°C and +85°C. To order, change prefix from 'ULN' to 'ULQ'.

**The ULx2804, ULx2823, & ULx2824 are discontinued. Shown for reference only.**

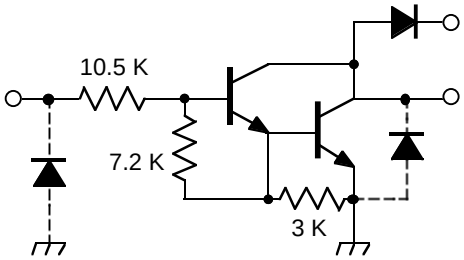
## PARTIAL SCHEMATICS

**ULx28x3A/LW (Each Driver)**

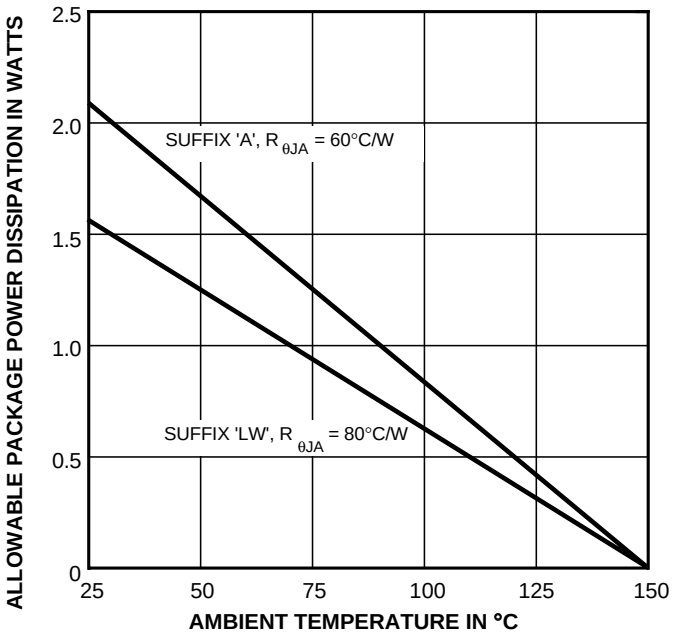



Dwg. FP-052-2

**ULx28x4A/LW (Each Driver)**




Dwg. FP-052-3




Dwg. GP-018B

x = Character to identify specific device. Specification shown applies to family of devices with remaining digits as shown. See matrix above.



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## Types ULx2803A, ULx2803LW, ULx2804A, and ULx2804LW ELECTRICAL CHARACTERISTICS at +25°C (unless otherwise noted).

| Characteristic | Symbol | Test Fig. | Applicable Devices | Test Conditions | Limits | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Typ. | Max. | Units |
| Output Leakage Current | $I_{CEX}$ | 1A | All | $V_{CE}$ = 50 V, $T_A$ = 25°C | — | < 1 | 50 | µA |
| | | | | $V_{CE}$ = 50 V, $T_A$ = 70°C | — | < 1 | 100 | µA |
| | | 1B | ULx2804x | $V_{CE}$ = 50 V, $T_A$ = 70°C, $V_{IN}$ = 1.0 V | — | < 5 | 500 | µA |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | 2 | All | $I_C$ = 100 mA, $I_B$ = 250 µA | — | 0.9 | 1.1 | V |
| | | | | $I_C$ = 200 mA, $I_B$ = 350 µA | — | 1.1 | 1.3 | V |
| | | | | $I_C$ = 350 mA, $I_B$ = 500 µA | — | 1.3 | 1.6 | V |
| Input Current | $I_{IN(ON)}$ | 3 | ULx2803x | $V_{IN}$ = 3.85 V | — | 0.93 | 1.35 | mA |
| | | | ULx2804x | $V_{IN}$ = 5.0 V | — | 0.35 | 0.5 | mA |
| | | | | $V_{IN}$ = 12 V | — | 1.0 | 1.45 | mA |
| | $I_{IN(OFF)}$ | 4 | All | $I_C$ = 500 µA, $T_A$ = 70°C | 50 | 65 | — | µA |
| Input Voltage | $V_{IN(ON)}$ | 5 | ULx2803x | $V_{CE}$ = 2.0 V, $I_C$ = 200 mA | — | — | 2.4 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 250 mA | — | — | 2.7 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 300 mA | — | — | 3.0 | V |
| | | | ULx2804x | $V_{CE}$ = 2.0 V, $I_C$ = 125 mA | — | — | 5.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 200 mA | — | — | 6.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 275 mA | — | — | 7.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 350 mA | — | — | 8.0 | V |
| Input Capacitance | $C_{IN}$ | — | All | | — | 15 | 25 | pF |
| Turn-On Delay | $t_{PLH}$ | 8 | All | 0.5 $E_{IN}$ to 0.5 $E_{OUT}$ | — | 0.25 | 1.0 | µs |
| Turn-Off Delay | $t_{PHL}$ | 8 | All | 0.5 $E_{IN}$ to 0.5 $E_{OUT}$ | — | 0.25 | 1.0 | µs |
| Clamp Diode Leakage Current | $I_R$ | 6 | All | $V_R$ = 50 V, $T_A$ = 25°C | — | — | 50 | µA |
| | | | | $V_R$ = 50 V, $T_A$ = 70°C | — | — | 100 | µA |
| Clamp Diode Forward Voltage | $V_F$ | 7 | All | $I_F$ = 350 mA | — | 1.7 | 2.0 | V |

Complete part number includes prefix to operating temperature range: ULN = -20°C to +85°C, ULQ = -40°C to +85°C and a suffix to identify package style: A = DIP, LW = SOIC.

**The ULx2804 is discontinued.**
**Shown for reference only.**

## Types ULx2823A, ULN2823LW, ULx2824A, and ULN2824LW ELECTRICAL CHARACTERISTICS at +25°C (unless otherwise noted).

| Characteristic | Symbol | Test Fig. | Applicable Devices | Test Conditions | Limits | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Min. | Typ. | Max. | Units |
| Output Leakage Current | $I_{CEX}$ | 1A | All | $V_{CE}$ = 95 V, $T_A$ = 25°C | — | < 1 | 50 | µA |
| | | | | $V_{CE}$ = 95 V, $T_A$ = 70°C | — | < 1 | 100 | µA |
| | | 1B | ULx2824x | $V_{CE}$ = 95 V, $T_A$ = 70°C, $V_{IN}$ = 1.0 V | — | < 5 | 500 | µA |
| Collector-Emitter Saturation Voltage | $V_{CE(SAT)}$ | 2 | All | $I_C$ = 100 mA, $I_B$ = 250 µA | — | 0.9 | 1.1 | V |
| | | | | $I_C$ = 200 mA, $I_B$ = 350 µA | — | 1.1 | 1.3 | V |
| | | | | $I_C$ = 350 mA, $I_B$ = 500 µA | — | 1.3 | 1.6 | V |
| Input Current | $I_{IN(ON)}$ | 3 | ULx2823x | $V_{IN}$ = 3.85 V | — | 0.93 | 1.35 | mA |
| | | | ULx2824x | $V_{IN}$ = 5.0 V | — | 0.35 | 0.5 | mA |
| | | | | $V_{IN}$ = 12 V | — | 1.0 | 1.45 | mA |
| | $I_{IN(OFF)}$ | 4 | All | $I_C$ = 500 µA, $T_A$ = 70°C | 50 | 65 | — | µA |
| Input Voltage | $V_{IN(ON)}$ | 5 | ULx2823x | $V_{CE}$ = 2.0 V, $I_C$ = 200 mA | — | — | 2.4 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 250 mA | — | — | 2.7 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 300 mA | — | — | 3.0 | V |
| | | | ULx2824x | $V_{CE}$ = 2.0 V, $I_C$ = 125 mA | — | — | 5.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 200 mA | — | — | 6.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 275 mA | — | — | 7.0 | V |
| | | | | $V_{CE}$ = 2.0 V, $I_C$ = 350 mA | — | — | 8.0 | V |
| Input Capacitance | $C_{IN}$ | — | All | | — | 15 | 25 | pF |
| Turn-On Delay | $t_{PLH}$ | 8 | All | 0.5 $E_{IN}$ to 0.5 $E_{OUT}$ | — | 0.25 | 1.0 | µs |
| Turn-Off Delay | $t_{PHL}$ | 8 | All | 0.5 $E_{IN}$ to 0.5 $E_{OUT}$ | — | 0.25 | 1.0 | µs |
| Clamp Diode Leakage Current | $I_R$ | 6 | All | $V_R$ = 95 V, $T_A$ = 25°C | — | — | 50 | µA |
| | | | | $V_R$ = 95 V, $T_A$ = 70°C | — | — | 100 | µA |
| Clamp Diode Forward Voltage | $V_F$ | 7 | All | $I_F$ = 350 mA | — | 1.7 | 2.0 | V |

Complete part number includes prefix to operating temperature range: ULN = -20°C to +85°C, ULQ = -40°C to +85°C and a suffix to identify package style: A = DIP, LW = SOIC. Note that the ULQ2823LW and ULQ2824LW are not presently available.

**The ULx2823 & ULx2824 are discontinued.**
**Shown for reference only.**



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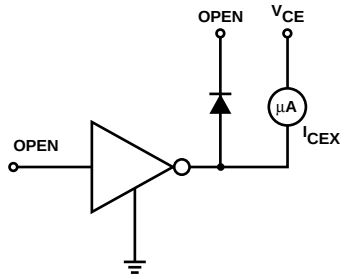
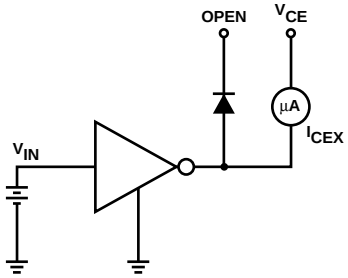
## TEST FIGURES

### FIGURE 1A



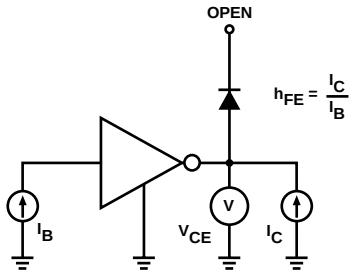

Dwg. No. A-9729A

### FIGURE 1B



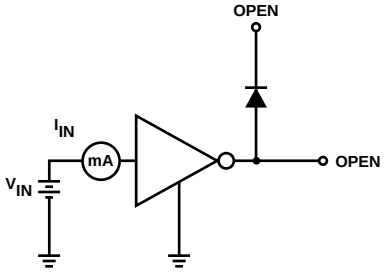

Dwg. No. A-9730A

### FIGURE 2



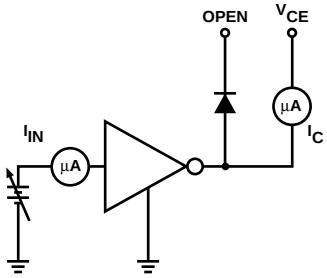

Dwg. No. A-9731A

### FIGURE 3



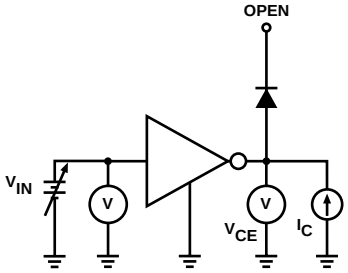

Dwg. No. A-9732A

### FIGURE 4



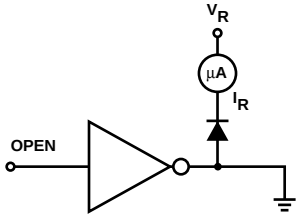

Dwg. No. A-9733A

### FIGURE 5



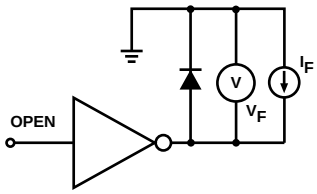

Dwg. No. A-9734A

### FIGURE 6



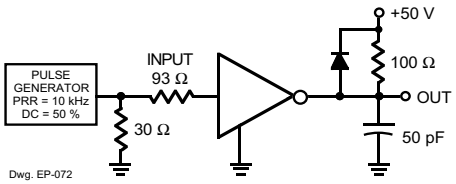

Dwg. No. A-9735A

### FIGURE 7



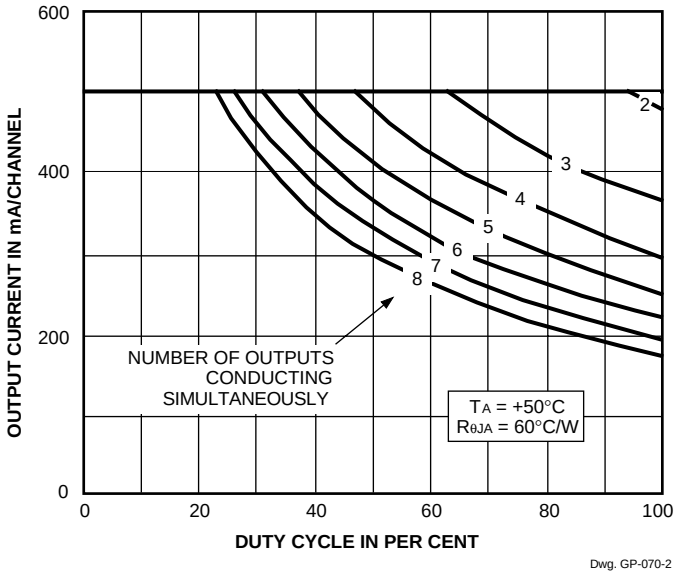

Dwg. No. A-9736A

### FIGURE 8



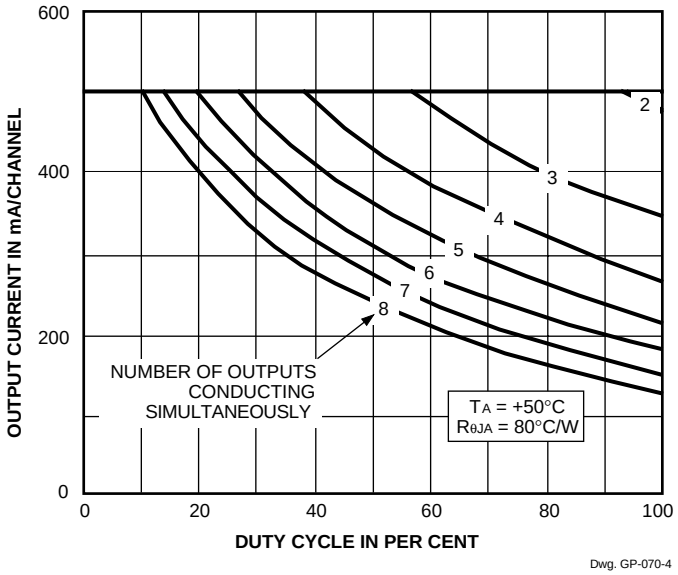

| | $V_{in}$ |
|---|---|
| ULx28x3x | 3.5 V |
| ULx28x4x | 12 V |

## ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE
**ULx28xxA**

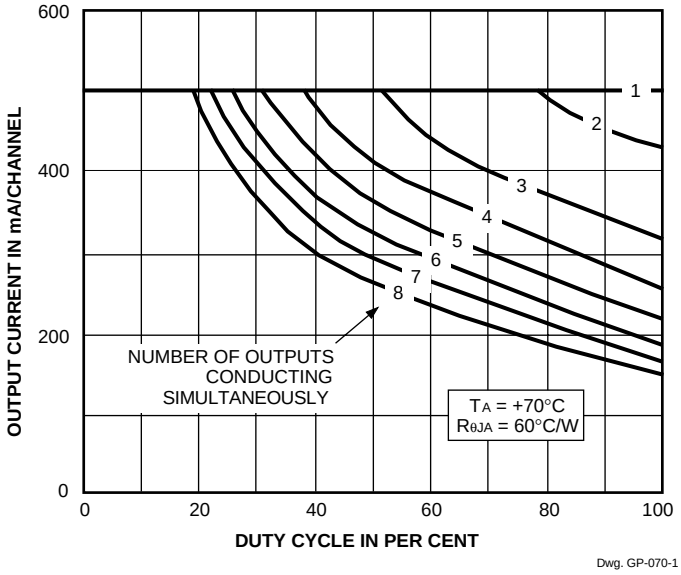



Dwg. GP-070-2

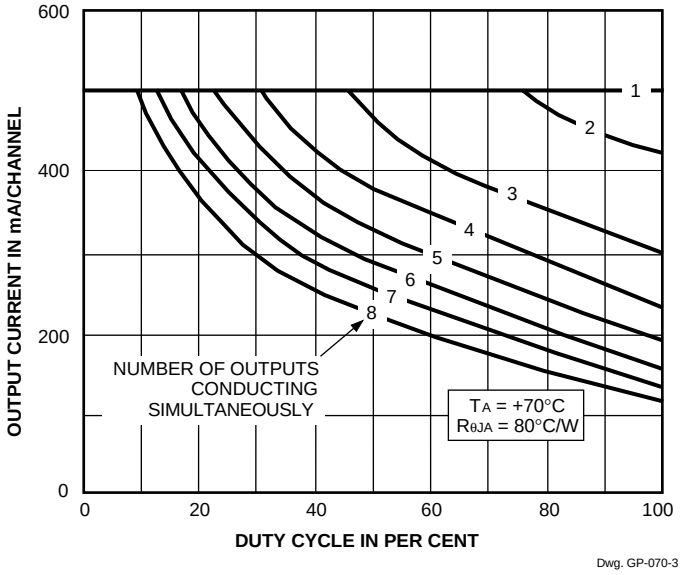
## ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE
**ULx28xxLW**




Dwg. GP-070-4




Dwg. GP-070-1




Dwg. GP-070-3

x = Characters to identify specific device. Specification shown applies to family of devices with remaining digits as shown.



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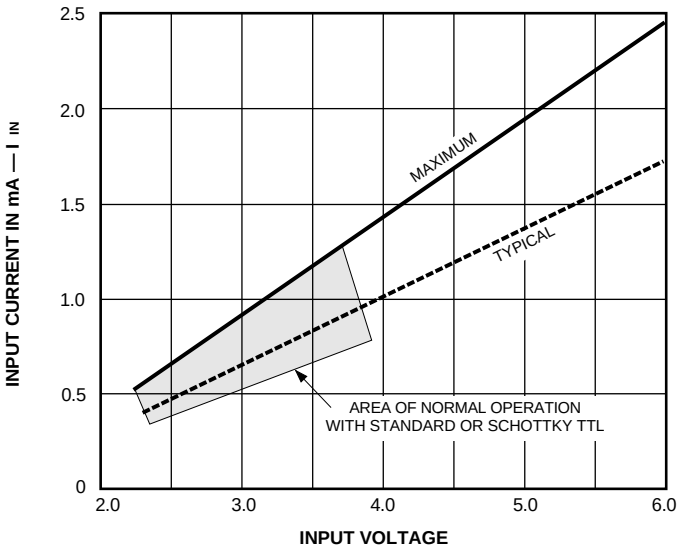
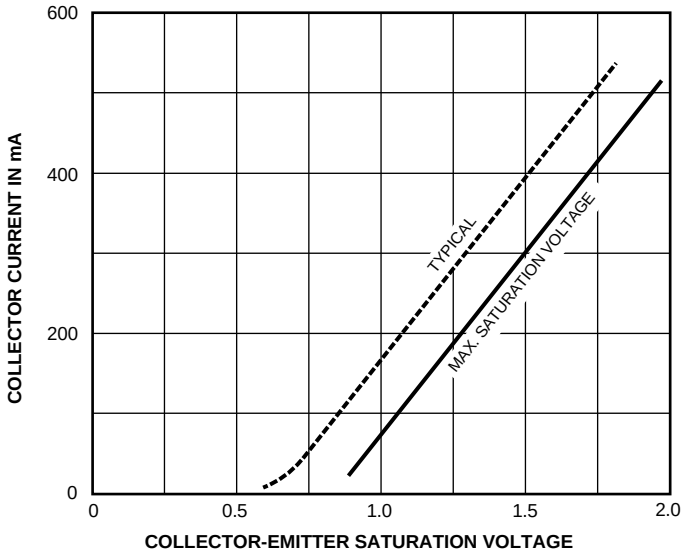
## INPUT CURRENT AS A FUNCTION OF INPUT VOLTAGE

**ULx28x3x**



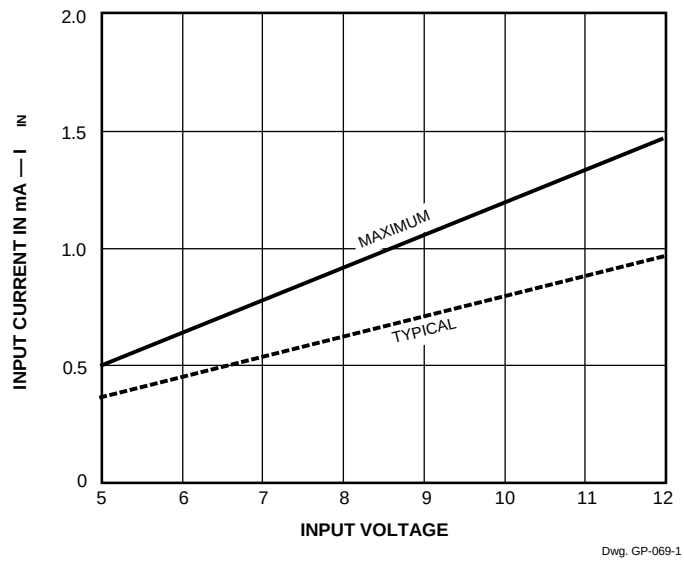

Dwg. GP-069

## SATURATION VOLTAGE AS A FUNCTION OF COLLECTOR CURRENT



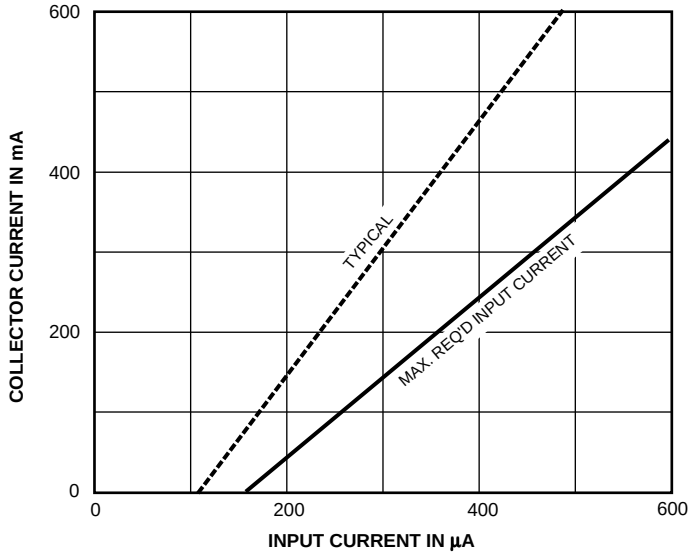

Dwg. GP-067

## ULx28x4x




Dwg. GP-069-1

## COLLECTOR CURRENT AS A FUNCTION OF INPUT CURRENT




Dwg. GP-068

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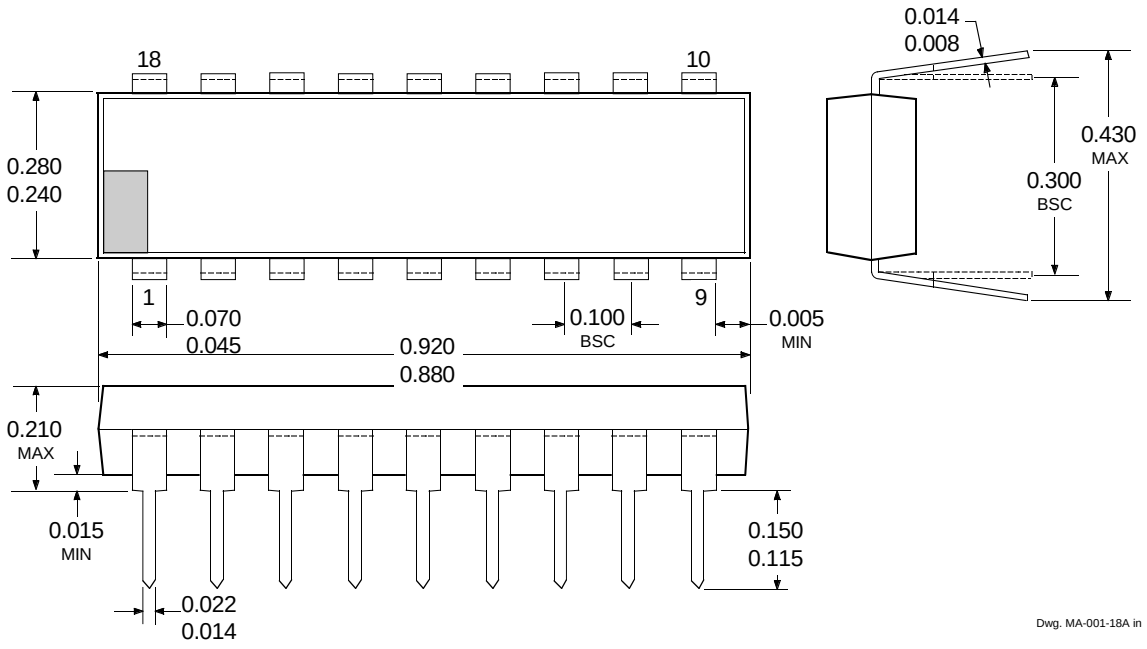
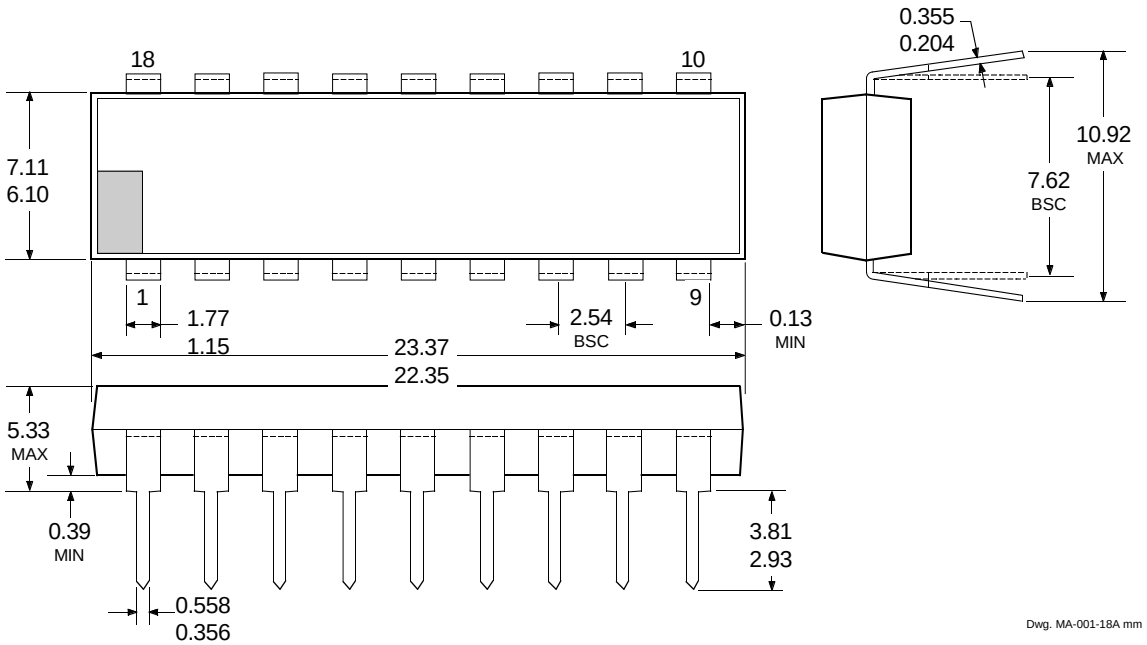
## PACKAGE DESIGNATOR "A" DIMENSIONS

Dimensions in Inches
(controlling dimensions)




Dwg. MA-001-18A in

Dimensions in Millimeters
(for reference only)




Dwg. MA-001-18A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative.
3. Lead thickness is measured at seating plane or below.



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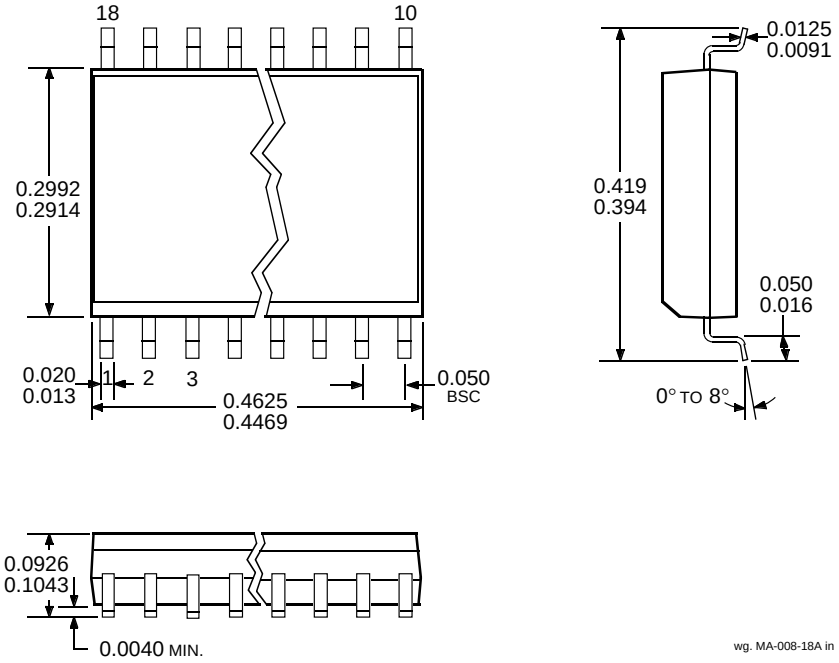
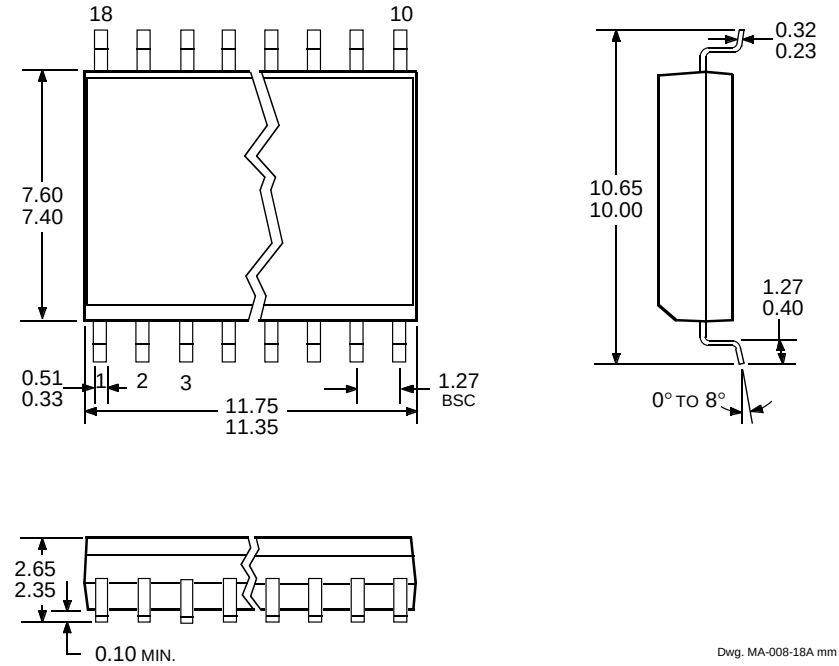
## PACKAGE DESIGNATOR "LW" DIMENSIONS

Dimensions in Inches
(for reference only)




wg. MA-008-18A in

Dimensions in Millimeters
(controlling dimensions)




Dwg. MA-008-18A mm

NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative.

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