

# 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:**

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

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# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

## DEVICE PART NUMBER DESIGNATION

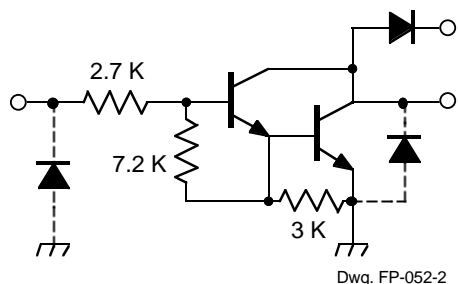
$V_{CE(MAX)}$	50 V	95 V
$I_{C(MAX)}$	500 mA	500 mA
<b>Logic</b>	<b>Part Number</b>	
5V TTL, CMOS	ULN2803A* ULN2803LW*	ULN2823A* ULN2823LW
6-15 V CMOS, PMOS	ULN2804A* ULN2804LW*	ULN2824A* ULN2824LW

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

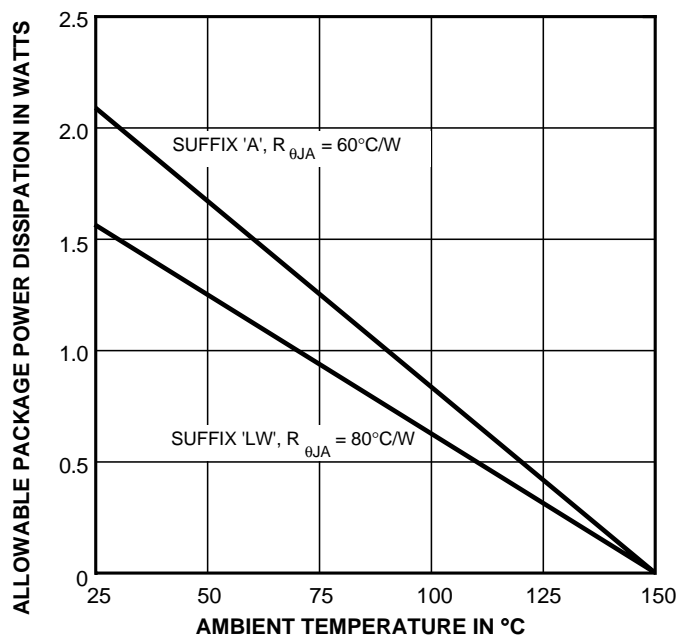
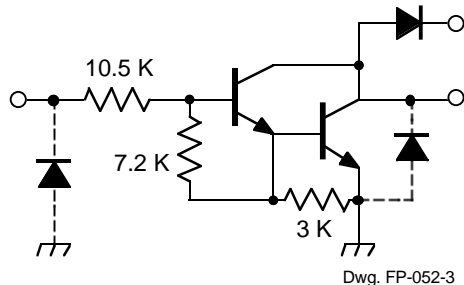
**The ULx2804, ULx2823, & ULx2824 are discontinued.  
Shown for reference only.**

## PARTIAL SCHEMATICS

ULx28x3A/LW (Each Driver)



ULx28x4A/LW (Each Driver)



Dwg. GP-018B

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

# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

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	$V_{CE} = 50\text{ V}, T_A = 25^\circ\text{C}$	—	< 1	50	$\mu\text{A}$
				$V_{CE} = 50\text{ V}, T_A = 70^\circ\text{C}$	—	< 1	100	$\mu\text{A}$
		1B	ULx2804x	$V_{CE} = 50\text{ V}, T_A = 70^\circ\text{C}, V_{IN} = 1.0\text{ V}$	—	< 5	500	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	2	All	$I_C = 100\text{ mA}, I_B = 250\text{ }\mu\text{A}$	—	0.9	1.1	V
				$I_C = 200\text{ mA}, I_B = 350\text{ }\mu\text{A}$	—	1.1	1.3	V
				$I_C = 350\text{ mA}, I_B = 500\text{ }\mu\text{A}$	—	1.3	1.6	V
Input Current	$I_{IN(ON)}$	3	ULx2803x	$V_{IN} = 3.85\text{ V}$	—	0.93	1.35	mA
			ULx2804x	$V_{IN} = 5.0\text{ V}$	—	0.35	0.5	mA
				$V_{IN} = 12\text{ V}$	—	1.0	1.45	mA
	$I_{IN(OFF)}$	4	All	$I_C = 500\text{ }\mu\text{A}, T_A = 70^\circ\text{C}$	50	65	—	$\mu\text{A}$
Input Voltage	$V_{IN(ON)}$	5	ULx2803x	$V_{CE} = 2.0\text{ V}, I_C = 200\text{ mA}$	—	—	2.4	V
				$V_{CE} = 2.0\text{ V}, I_C = 250\text{ mA}$	—	—	2.7	V
				$V_{CE} = 2.0\text{ V}, I_C = 300\text{ mA}$	—	—	3.0	V
			ULx2804x	$V_{CE} = 2.0\text{ V}, I_C = 125\text{ mA}$	—	—	5.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 200\text{ mA}$	—	—	6.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 275\text{ mA}$	—	—	7.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 350\text{ mA}$	—	—	8.0	V
Input Capacitance	$C_{IN}$	—	All		—	15	25	pF
Turn-On Delay	$t_{PLH}$	8	All	$0.5\text{ }E_{IN}\text{ to }0.5\text{ }E_{OUT}$	—	0.25	1.0	$\mu\text{s}$
Turn-Off Delay	$t_{PHL}$	8	All	$0.5\text{ }E_{IN}\text{ to }0.5\text{ }E_{OUT}$	—	0.25	1.0	$\mu\text{s}$
Clamp Diode Leakage Current	$I_R$	6	All	$V_R = 50\text{ V}, T_A = 25^\circ\text{C}$	—	—	50	$\mu\text{A}$
				$V_R = 50\text{ V}, T_A = 70^\circ\text{C}$	—	—	100	$\mu\text{A}$
Clamp Diode Forward Voltage	$V_F$	7	All	$I_F = 350\text{ mA}$	—	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.**

# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

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	$V_{CE} = 95\text{ V}, T_A = 25^\circ\text{C}$	—	< 1	50	$\mu\text{A}$
				$V_{CE} = 95\text{ V}, T_A = 70^\circ\text{C}$	—	< 1	100	$\mu\text{A}$
		1B	ULx2824x	$V_{CE} = 95\text{ V}, T_A = 70^\circ\text{C}, V_{IN} = 1.0\text{ V}$	—	< 5	500	$\mu\text{A}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	2	All	$I_C = 100\text{ mA}, I_B = 250\text{ }\mu\text{A}$	—	0.9	1.1	V
				$I_C = 200\text{ mA}, I_B = 350\text{ }\mu\text{A}$	—	1.1	1.3	V
				$I_C = 350\text{ mA}, I_B = 500\text{ }\mu\text{A}$	—	1.3	1.6	V
Input Current	$I_{IN(ON)}$	3	ULx2823x	$V_{IN} = 3.85\text{ V}$	—	0.93	1.35	mA
			ULx2824x	$V_{IN} = 5.0\text{ V}$	—	0.35	0.5	mA
				$V_{IN} = 12\text{ V}$	—	1.0	1.45	mA
	$I_{IN(OFF)}$	4	All	$I_C = 500\text{ }\mu\text{A}, T_A = 70^\circ\text{C}$	50	65	—	$\mu\text{A}$
Input Voltage	$V_{IN(ON)}$	5	ULx2823x	$V_{CE} = 2.0\text{ V}, I_C = 200\text{ mA}$	—	—	2.4	V
				$V_{CE} = 2.0\text{ V}, I_C = 250\text{ mA}$	—	—	2.7	V
				$V_{CE} = 2.0\text{ V}, I_C = 300\text{ mA}$	—	—	3.0	V
			ULx2824x	$V_{CE} = 2.0\text{ V}, I_C = 125\text{ mA}$	—	—	5.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 200\text{ mA}$	—	—	6.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 275\text{ mA}$	—	—	7.0	V
				$V_{CE} = 2.0\text{ V}, I_C = 350\text{ mA}$	—	—	8.0	V
Input Capacitance	$C_{IN}$	—	All		—	15	25	pF
Turn-On Delay	$t_{PLH}$	8	All	$0.5\text{ }E_{IN}\text{ to }0.5\text{ }E_{OUT}$	—	0.25	1.0	$\mu\text{s}$
Turn-Off Delay	$t_{PHL}$	8	All	$0.5\text{ }E_{IN}\text{ to }0.5\text{ }E_{OUT}$	—	0.25	1.0	$\mu\text{s}$
Clamp Diode Leakage Current	$I_R$	6	All	$V_R = 95\text{ V}, T_A = 25^\circ\text{C}$	—	—	50	$\mu\text{A}$
				$V_R = 95\text{ V}, T_A = 70^\circ\text{C}$	—	—	100	$\mu\text{A}$
Clamp Diode Forward Voltage	$V_F$	7	All	$I_F = 350\text{ mA}$	—	1.7	2.0	V

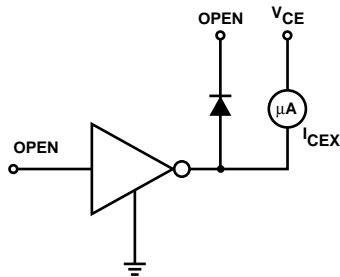
Complete part number includes prefix to operating temperature range: ULN = -20°C to +85°C, ULQ = -40°C to +85°C and a suffix to identify package style: A = DIP, LW = SOIC. Note that the ULQ2823LW and ULQ2824LW are not presently available.

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

# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

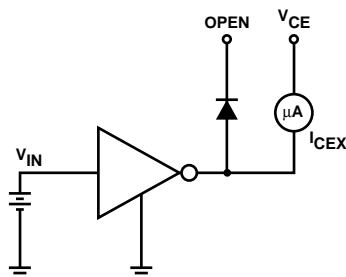
## TEST FIGURES

FIGURE 1A



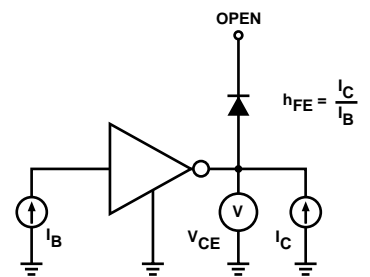
Dwg. No. A-9729A

FIGURE 1B



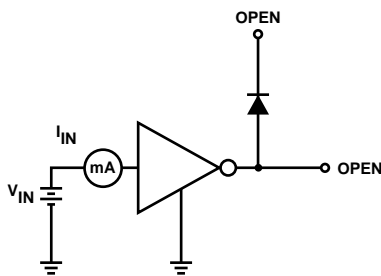
Dwg. No. A-9730A

FIGURE 2



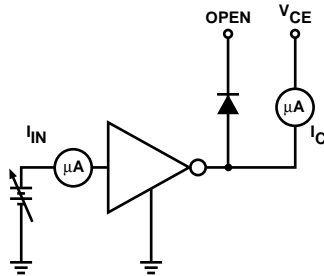
Dwg. No. A-9731A

FIGURE 3



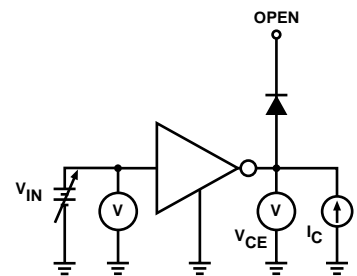
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FIGURE 4



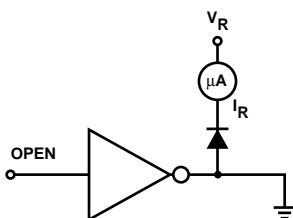
Dwg. No. A-9733A

FIGURE 5



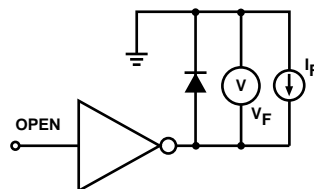
Dwg. No. A-9734A

FIGURE 6



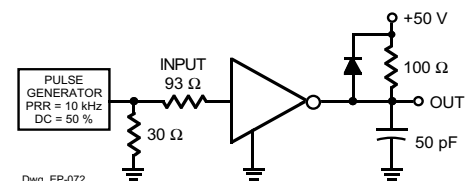
Dwg. No. A-9735A

FIGURE 7



Dwg. No. A-9736A

FIGURE 8



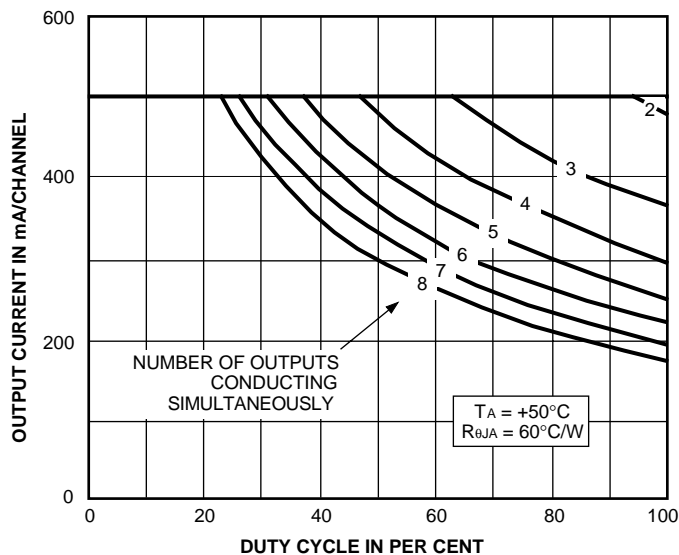
Dwg. EP-072

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

# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

## ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE

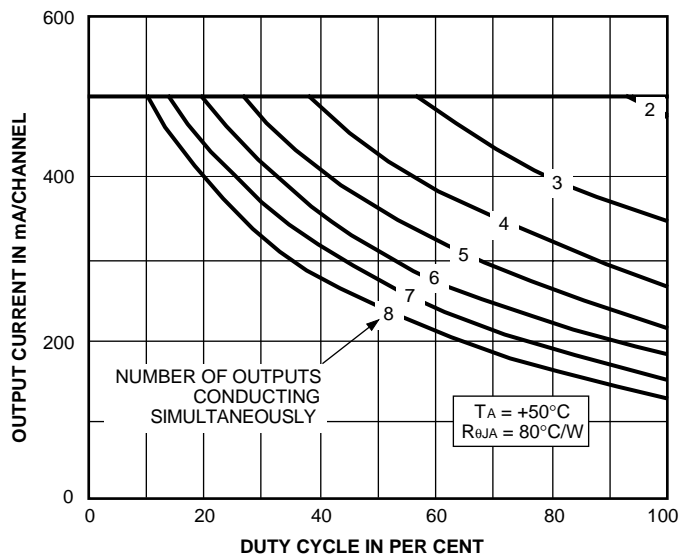
ULx28xxA



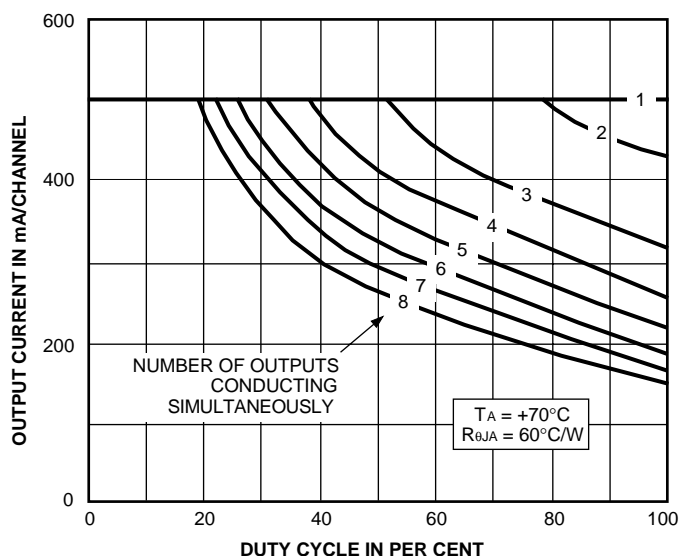
Dwg. GP-070-2

## ALLOWABLE COLLECTOR CURRENT AS A FUNCTION OF DUTY CYCLE

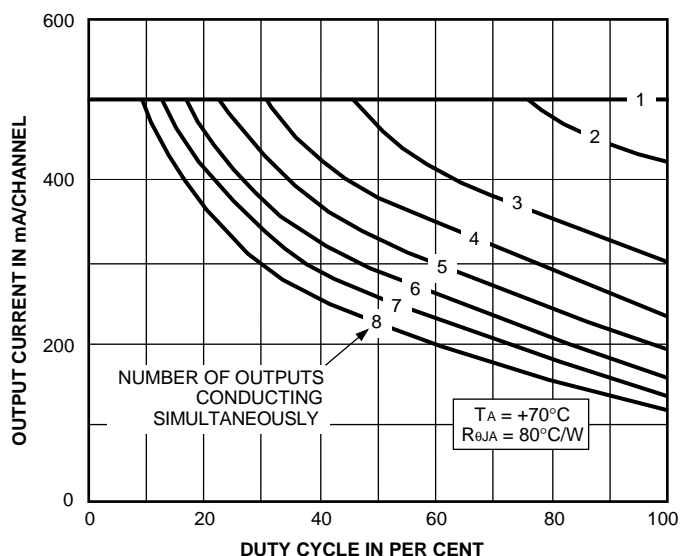
ULx28xxLW



Dwg. GP-070-4



Dwg. GP-070-1

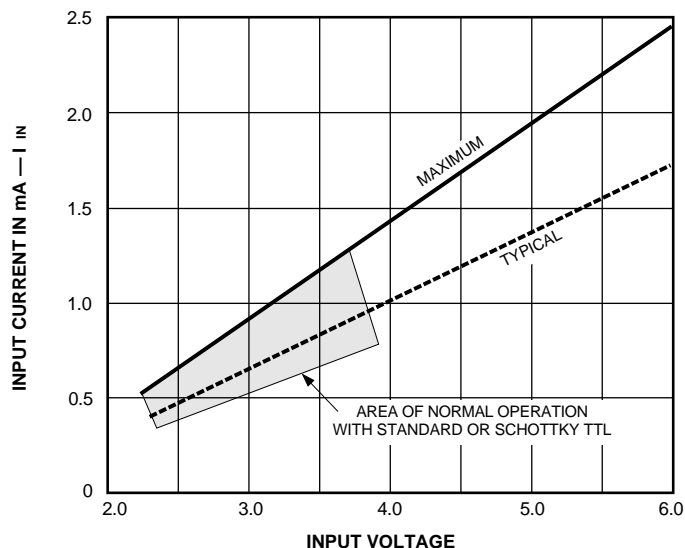


Dwg. GP-070-3

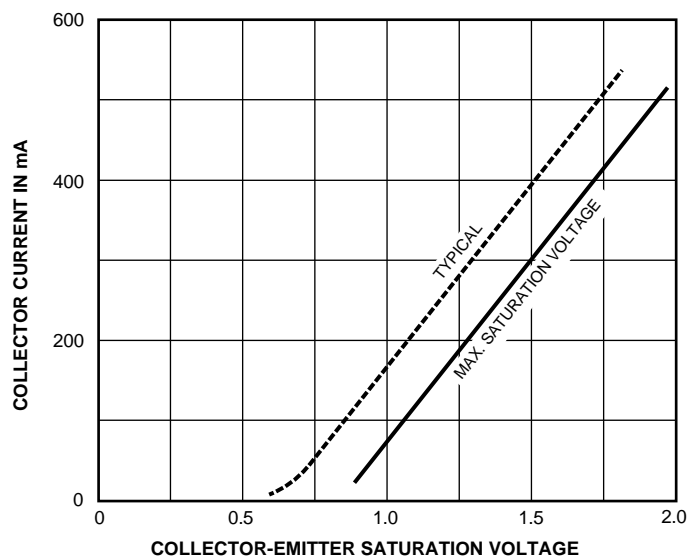
x = Characters to identify specific device. Specification shown applies to family of devices with remaining digits as shown.

# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

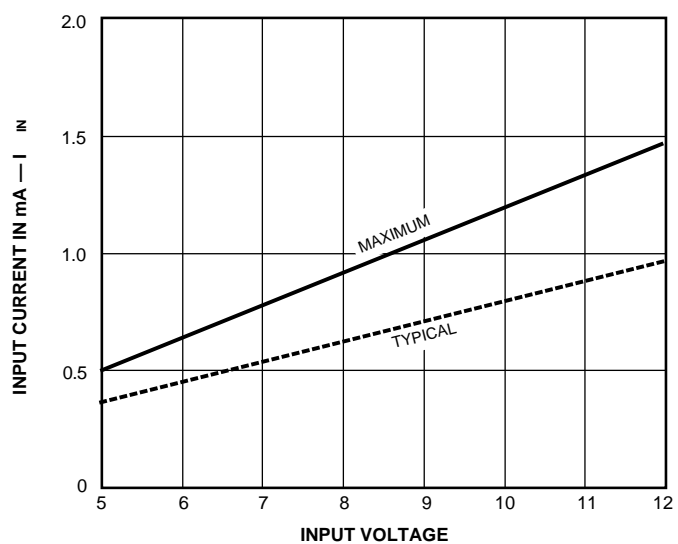
**INPUT CURRENT AS A  
FUNCTION OF INPUT VOLTAGE**  
ULx28x3x



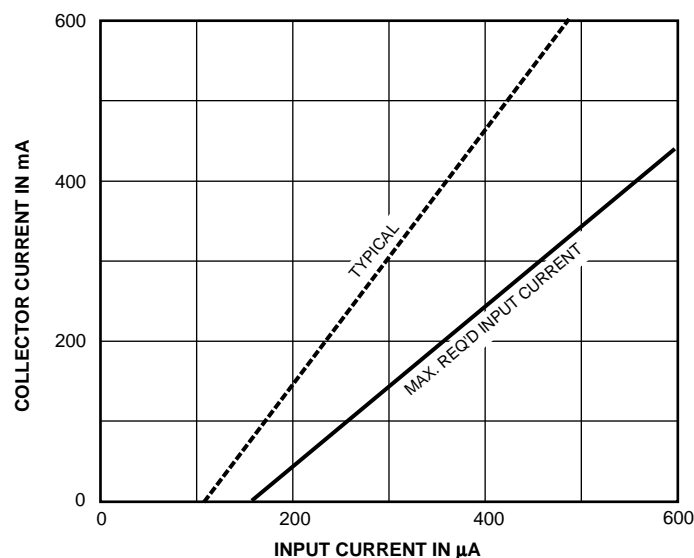
**SATURATION VOLTAGE AS A FUNCTION OF  
COLLECTOR CURRENT**



ULx28x4x



**COLLECTOR CURRENT AS A  
FUNCTION OF INPUT CURRENT**

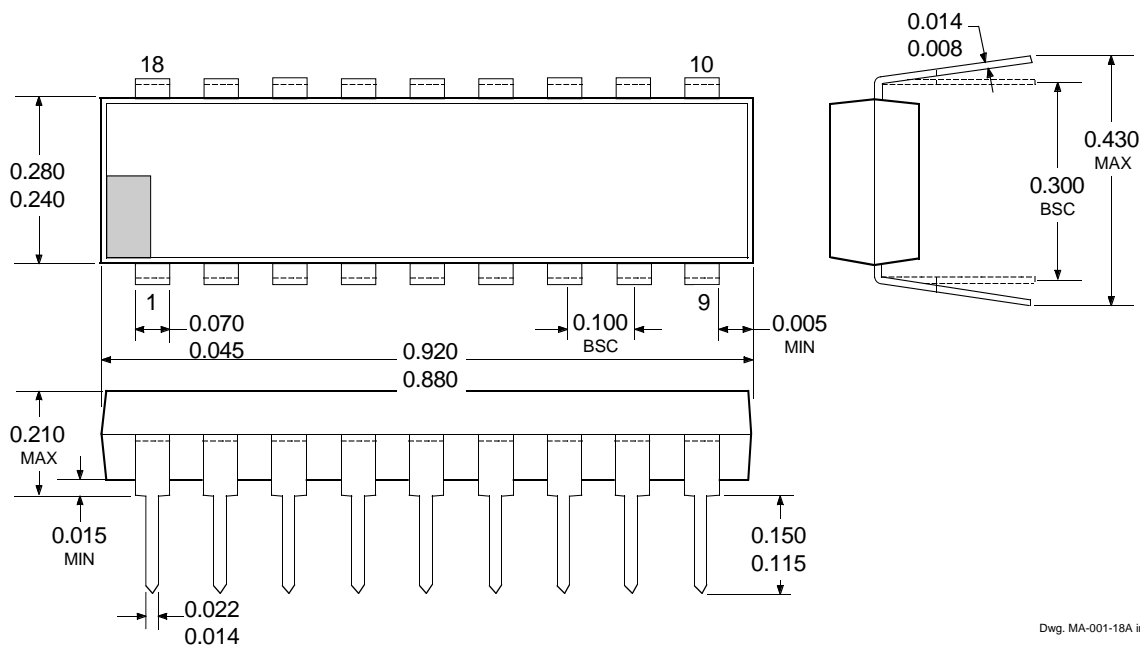


x = Characters to identify specific device. Characteristic shown applies to family of devices with remaining digits as shown.

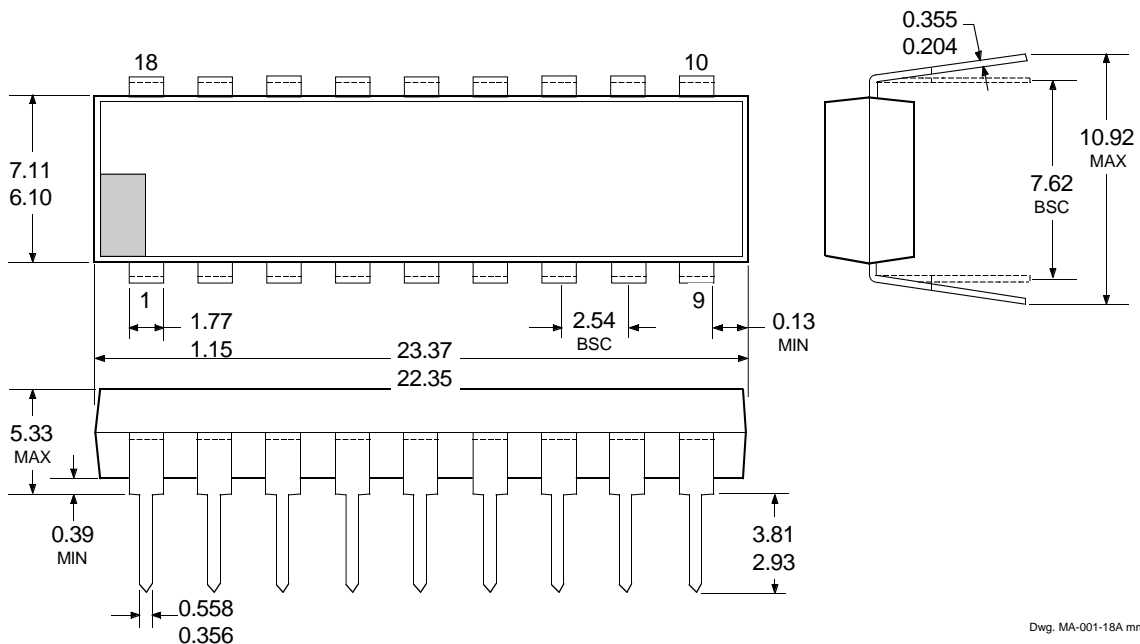
# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

## PACKAGE DESIGNATOR "A" DIMENSIONS

Dimensions in Inches  
(controlling dimensions)



Dimensions in Millimeters  
(for reference only)



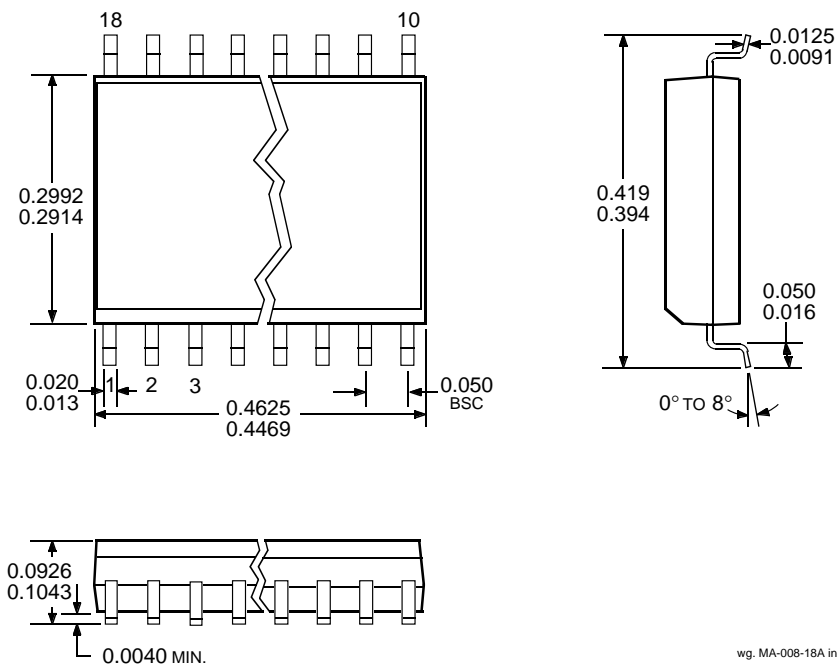
- NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.  
2. Lead spacing tolerance is non-cumulative.  
3. Lead thickness is measured at seating plane or below.



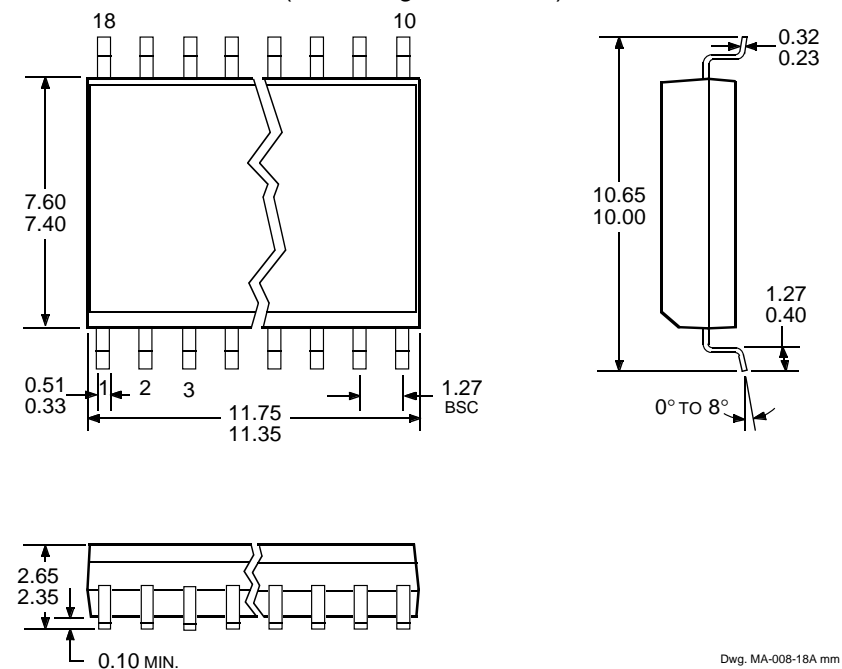
# 2803 THRU 2824 HIGH-VOLTAGE, HIGH-CURRENT DARLINGTON ARRAYS

## PACKAGE DESIGNATOR "LW" DIMENSIONS

Dimensions in Inches  
(for reference only)



Dimensions in Millimeters  
(controlling dimensions)



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

**2803 THRU 2824  
HIGH-VOLTAGE,  
HIGH-CURRENT  
DARLINGTON ARRAYS**

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