

# MPSA28, MPSA29

MPSA29 is a Preferred Device

## Darlington Transistors

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit	
Collector-Emitter Voltage	MPSA28 MPSA29	$V_{CES}$	80 100	Vdc
Collector-Base Voltage	MPSA28 MPSA29	$V_{CBO}$	80 100	Vdc
Emitter-Base Voltage		$V_{EBO}$	12	Vdc
Collector Current - Continuous		$I_C$	500	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		$P_D$	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		$P_D$	1.5 12	W mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150		$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

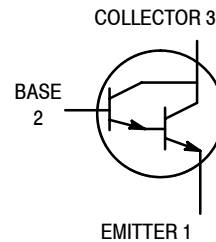
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

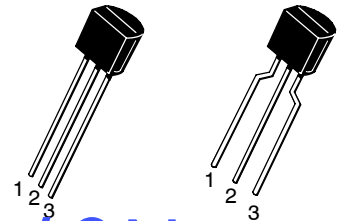


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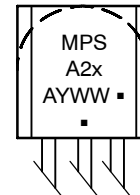
TO-92  
CASE 29  
STYLE 1



STRAIGHT LEAD  
BULK PACK

BENT LEAD  
TAPE & REEL  
AMMO PACK

#### MARKING DIAGRAM



- x = 8 or 9
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping
MPSA28RLRPG	TO-92 (Pb-Free)	2000/Ammo Pack
MPSA29G	TO-92 (Pb-Free)	5000 Units/Bulk
MPSA29RLRP	TO-92	2000/Ammo Pack
MPSA29RLRPG	TO-92 (Pb-Free)	2000/Ammo Pack

Preferred devices are recommended choices for future use and best overall value.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MPSA28, MPSA29

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Collector-Emitter Breakdown Voltage (I <sub>C</sub> = 100 μAdc, V <sub>BE</sub> = 0)	MPSA28 MPSA29	V <sub>(BR)CES</sub>	80 100	- -	- -	Vdc
Collector-Base Breakdown Voltage (I <sub>C</sub> = 100 μAdc, I <sub>E</sub> = 0)	MPSA28 MPSA29	V <sub>(BR)CBO</sub>	80 100	- -	- -	Vdc
Emitter-Base Breakdown Voltage (I <sub>E</sub> = 10 μAdc, I <sub>C</sub> = 0)		V <sub>(BR)EBO</sub>	12	-	-	Vdc
Collector Cutoff Current (V <sub>CB</sub> = 60 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = 80 Vdc, I <sub>E</sub> = 0)	MPSA28 MPSA29	I <sub>CBO</sub>	- -	- -	100 100	nAdc
Collector Cutoff Current (V <sub>CE</sub> = 60 Vdc, V <sub>BE</sub> = 0) (V <sub>CE</sub> = 80 Vdc, V <sub>BE</sub> = 0)	MPSA28 MPSA29	I <sub>CES</sub>	- -	- -	500 500	nAdc
Emitter Cutoff Current (V <sub>EB</sub> = 10 Vdc, I <sub>C</sub> = 0)		I <sub>EBO</sub>	-	-	100	nAdc

## ON CHARACTERISTICS (Note 1)

DC Current Gain (I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 5.0 Vdc) (I <sub>C</sub> = 100 mAdc, V <sub>CE</sub> = 5.0 Vdc)		h <sub>FE</sub>	10,000 10,000	- -	- -	-
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0.01 mAdc) (I <sub>C</sub> = 100 mAdc, I <sub>B</sub> = 0.1 mAdc)		V <sub>CE(sat)</sub>	- -	0.7 0.8	1.2 1.5	Vdc
Base-Emitter On Voltage (I <sub>C</sub> = 100 mAdc, V <sub>CE</sub> = 5.0 Vdc)		V <sub>BE(on)</sub>	-	1.4	2.0	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain - Bandwidth Product (Note 2) (I <sub>C</sub> = 10 mAdc, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)		f <sub>T</sub>	125	200	-	MHz
Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)		C <sub>obo</sub>	-	5.0	8.0	pF

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

2. f<sub>T</sub> = h<sub>fe</sub> • f<sub>test</sub>.

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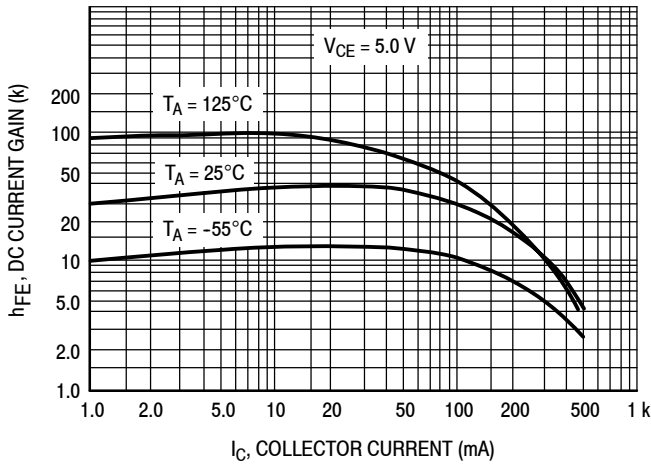


Figure 1. DC Current Gain

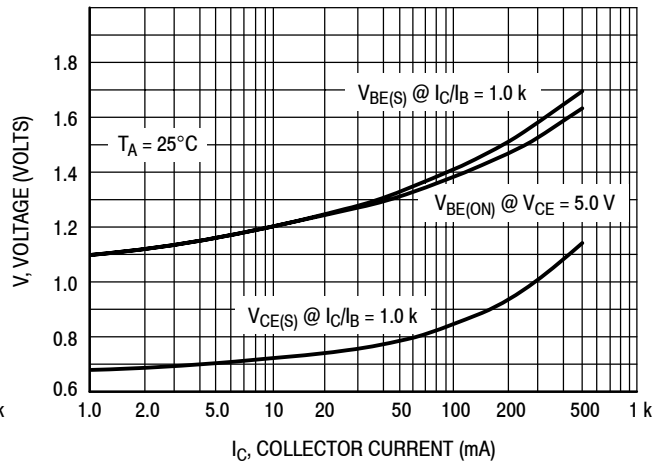


Figure 2. "ON" Voltages

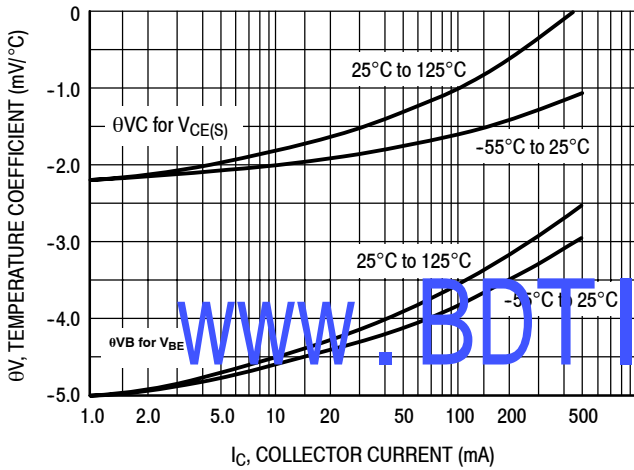


Figure 3. Temperature Coefficients

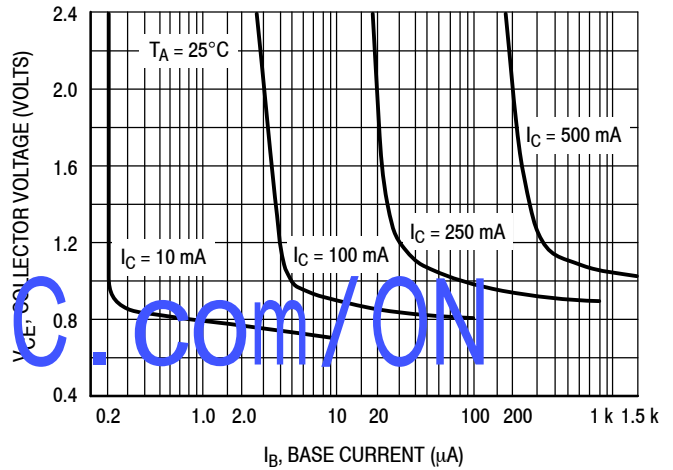


Figure 4. Collector Saturation Region

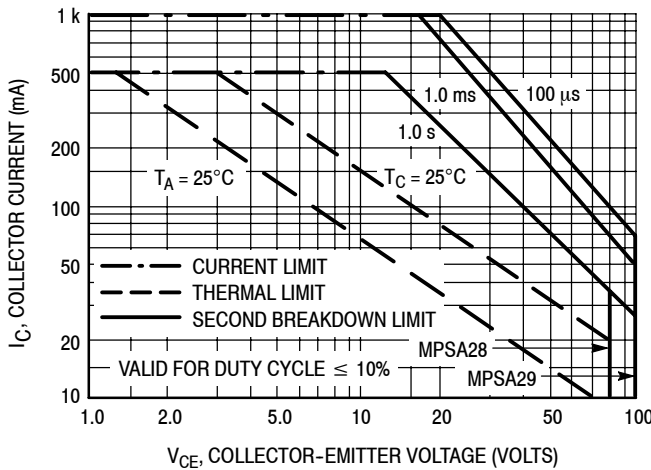


Figure 5. Active Region - Safe Operating Area

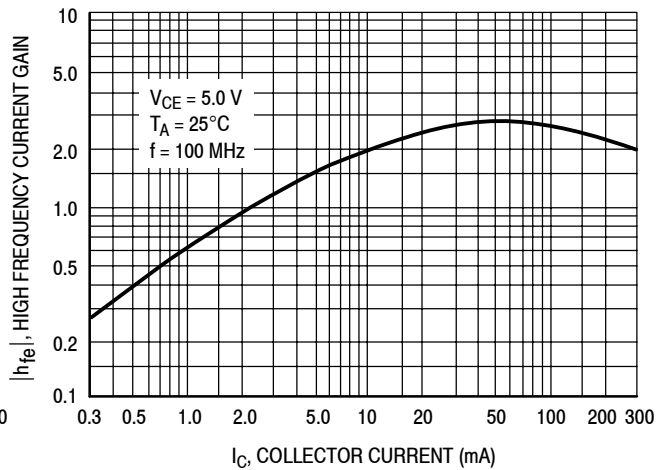
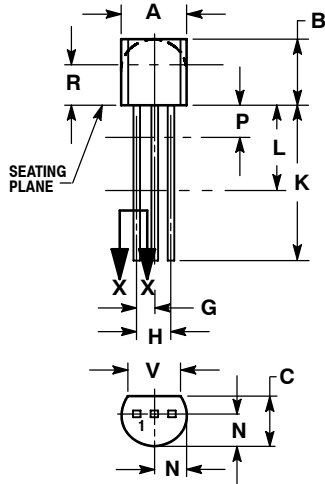


Figure 6. High Frequency Current Gain

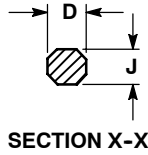
# MPSA28, MPSA29

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
ISSUE AM



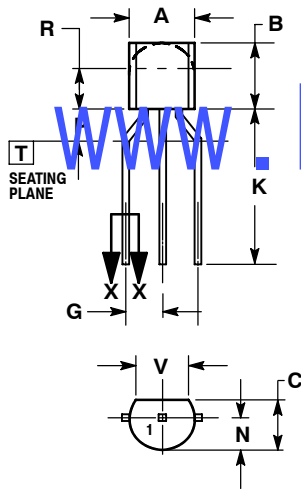
STRAIGHT LEAD  
BULK PACK



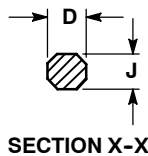
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.021	0.407	0.533
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	---	12.70	---
L	0.250	---	6.35	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.115	---	2.93	---
V	0.135	---	3.43	---



BENT LEAD  
TAPE & REEL  
AMMO PACK



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS	
	MIN	MAX
A	4.45	5.20
B	4.32	5.33
C	3.18	4.19
D	0.40	0.54
G	2.40	2.80
J	0.39	0.50
K	12.70	---
N	2.04	2.66
P	1.50	4.00
R	2.93	---
V	3.43	---

STYLE 1:

1. EMITTER
2. BASE
3. COLLECTOR

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