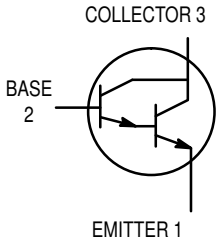
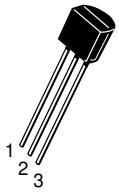
Darlington Transistors
NPN Silicon

MPSA28
MPSA29*

***Motorola Preferred Device**





CASE 29–04, STYLE 1
TO–92 (TO–226AA)

MAXIMUM RATINGS

Rating	Symbol	MPSA28	MPSA29	Unit
Collector–Emitter Voltage	V_{CES}	80	100	Vdc
Collector–Base Voltage	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°C Derate above 25°C	P_D	625 5.0		mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12		Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150		°C

THERMAL CHARACTERISTICS

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage (I_C = 100 μAdc, V_{BE} = 0)	 MPSA28 MPSA29	$V_{(BR)CES}$	 80 100	 — —	 — —	Vdc
Collector–Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	 MPSA28 MPSA29	$V_{(BR)CBO}$	 80 100	 — —	 — —	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)		$V_{(BR)EBO}$	12	—	—	Vdc
Collector Cutoff Current (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 80 Vdc, I_E = 0)	 MPSA28 MPSA29	I_{CBO}	 — —	 — —	 100 100	nAdc
Collector Cutoff Current (V_{CE} = 60 Vdc, V_{BE} = 0) (V_{CE} = 80 Vdc, V_{BE} = 0)	 MPSA28 MPSA29	I_{CES}	 — —	 — —	 500 500	nAdc
Emitter Cutoff Current (V_{EB} = 10 Vdc, I_C = 0)		I_{EBO}	—	—	100	nAdc

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS(1)					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 5.0 Vdc) (I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	h_{FE}	 10,000 10,000	 — —	 — —	—
Collector–Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 0.01 mAdc) (I_C = 100 mAdc, I_B = 0.1 mAdc)	$V_{CE(sat)}$	 — —	 0.7 0.8	 1.2 1.5	Vdc
Base–Emitter On Voltage (I_C = 100 mAdc, V_{CE} = 5.0 Vdc)	$V_{BE(on)}$	—	1.4	2.0	Vdc
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain – Bandwidth Product(2) (I_C = 10 mAdc, V_{CE} = 5.0 Vdc, f = 100 MHz)	f_T	125	200	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	—	5.0	8.0	pF

1. Pulse Test: Pulse Width $\leq$ 300 μs, Duty Cycle $\leq$ 2.0%.
2. $f_T = h_{fe} \bullet f_{test}$.

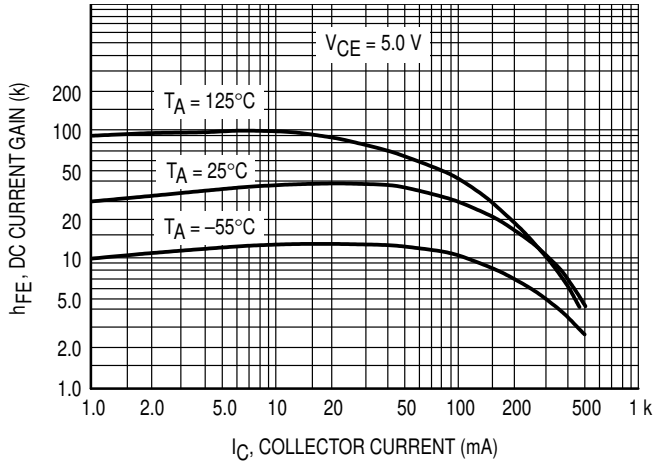


Figure 1. DC Current Gain

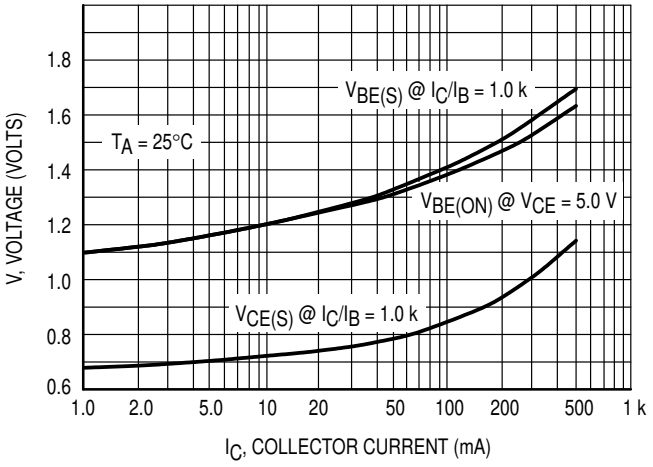


Figure 2. "ON" Voltages

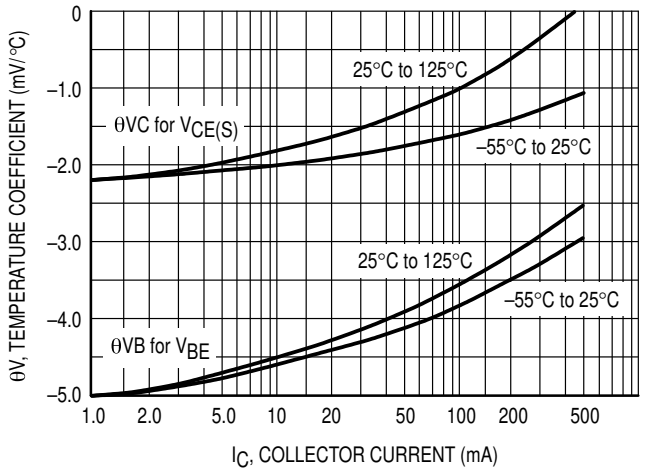


Figure 3. Temperature Coefficients

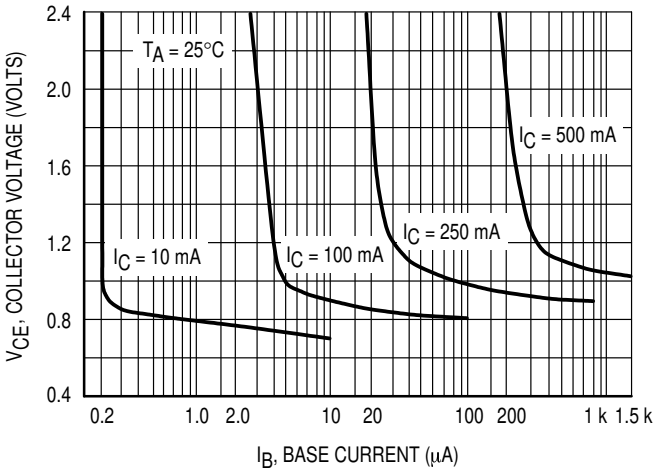


Figure 4. Collector Saturation Region

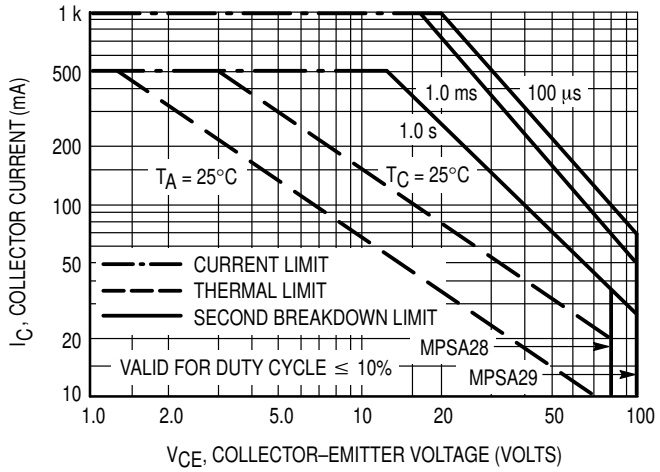


Figure 5. Active Region — Safe Operating Area

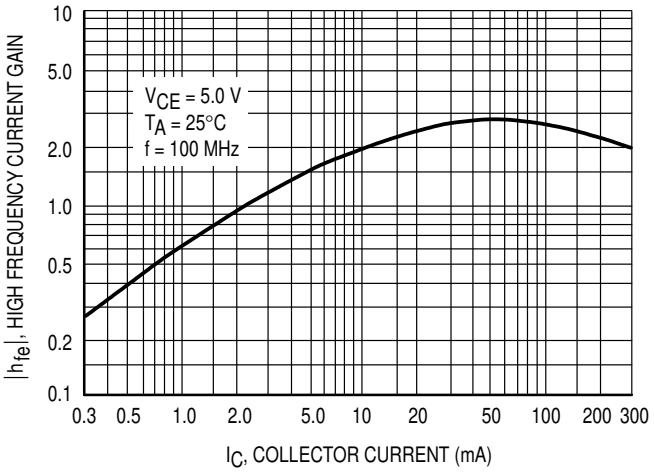
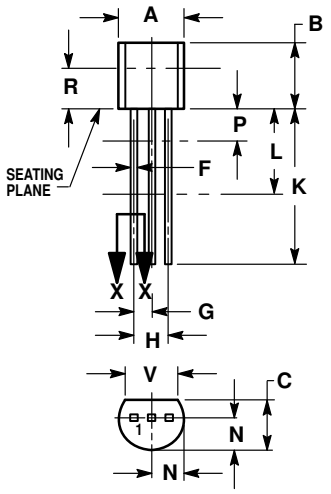
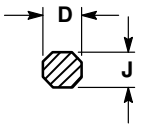


Figure 6. High Frequency Current Gain

PACKAGE DIMENSIONS





SECTION X–X

NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	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	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
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	—

CASE 029–04
(TO–226AA)
ISSUE AD

STYLE 1:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

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