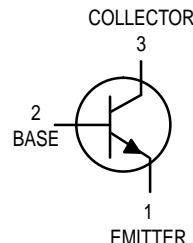


# High Voltage Transistors

## NPN Silicon

**MPSA42\***  
**MPSA43**

\*Motorola Preferred Device



CASE 29-04, STYLE 1  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	MPSA42	MPSA43	Unit
Collector-Emitter Voltage	$V_{CEO}$	300	200	Vdc
Collector-Base Voltage	$V_{CBO}$	300	200	Vdc
Emitter-Base Voltage	$V_{EBO}$	6.0	6.0	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		Watts mW/ $^\circ\text{C}$
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/mW
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/mW

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 1.0$ mA, $I_B = 0$ )	$V_{(BR)CEO}$	300 200	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100$ µA, $I_E = 0$ )	$V_{(BR)CBO}$	300 200	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100$ µA, $I_C = 0$ )	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 200$ Vdc, $I_E = 0$ ) ( $V_{CB} = 160$ Vdc, $I_E = 0$ )	$I_{CBO}$	—	0.1 0.1	µAdc
Emitter Cutoff Current ( $V_{EB} = 6.0$ Vdc, $I_C = 0$ ) ( $V_{EB} = 4.0$ Vdc, $I_C = 0$ )	$I_{EBO}$	—	0.1 0.1	µAdc

1. Pulse Test: Pulse Width  $\leq 300$  µs, Duty Cycle  $\leq 2.0\%$ .

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

**MPSA42 MPSA43**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = 1.0 \text{ mA}_\text{dc}$ , $V_{CE} = 10 \text{ V}_\text{dc}$ ) ( $I_C = 10 \text{ mA}_\text{dc}$ , $V_{CE} = 10 \text{ V}_\text{dc}$ ) ( $I_C = 30 \text{ mA}_\text{dc}$ , $V_{CE} = 10 \text{ V}_\text{dc}$ )	$\text{h}_{FE}$	25 40 40	— — —	—
Collector-Emitter Saturation Voltage ( $I_C = 20 \text{ mA}_\text{dc}$ , $I_B = 2.0 \text{ mA}_\text{dc}$ )	$V_{CE(\text{sat})}$ MPSA42 MPSA43	— —	0.5 0.4	$\text{V}_\text{dc}$
Base-Emitter Saturation Voltage ( $I_C = 20 \text{ mA}_\text{dc}$ , $I_B = 2.0 \text{ mA}_\text{dc}$ )	$V_{BE(\text{sat})}$	—	0.9	$\text{V}_\text{dc}$
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current-Gain — Bandwidth Product ( $I_C = 10 \text{ mA}_\text{dc}$ , $V_{CE} = 20 \text{ V}_\text{dc}$ , $f = 100 \text{ MHz}$ )	$f_T$	50	—	$\text{MHz}$
Collector-Base Capacitance ( $V_{CB} = 20 \text{ V}_\text{dc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{cb}$ MPSA42 MPSA43	— —	3.0 4.0	$\text{pF}$

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

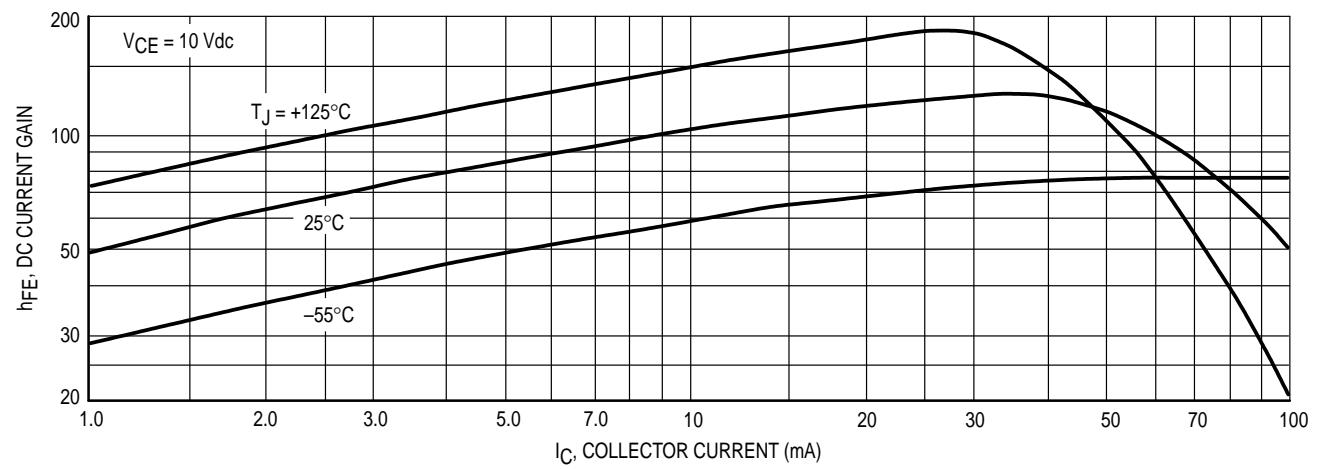


Figure 1. DC Current Gain

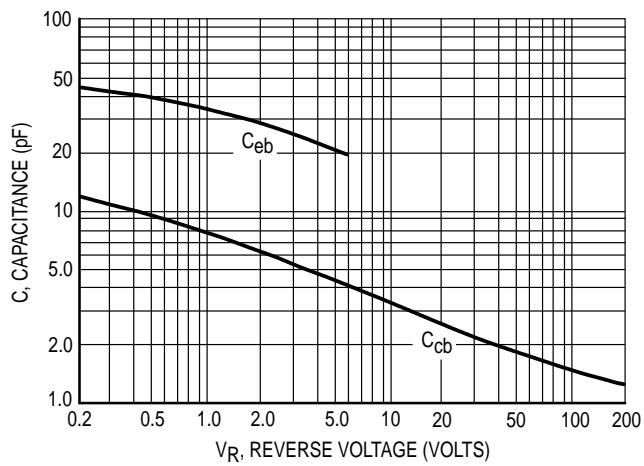


Figure 2. Capacitances

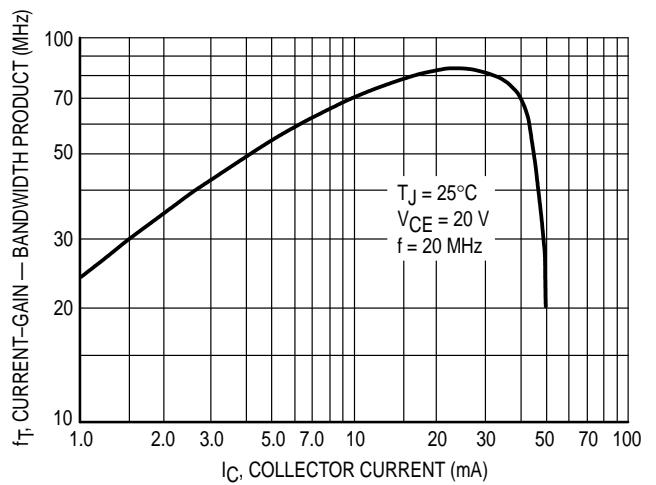


Figure 3. Current-Gain — Bandwidth Product

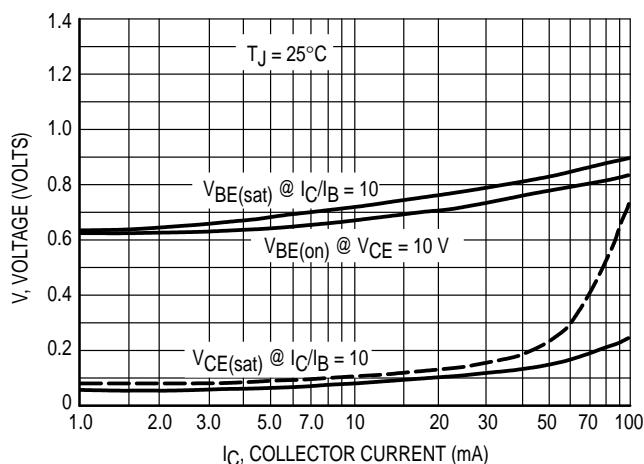
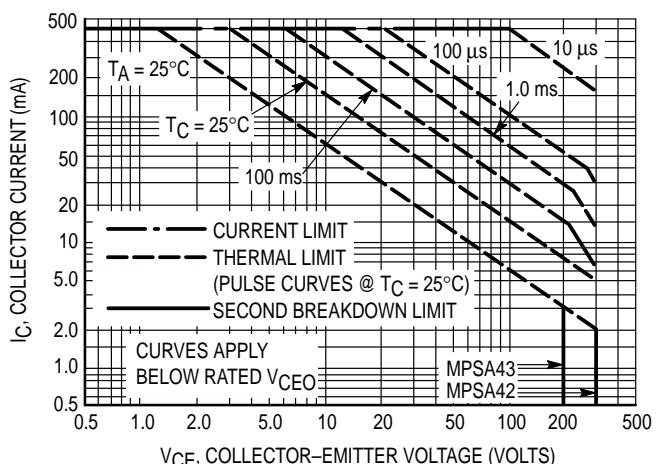
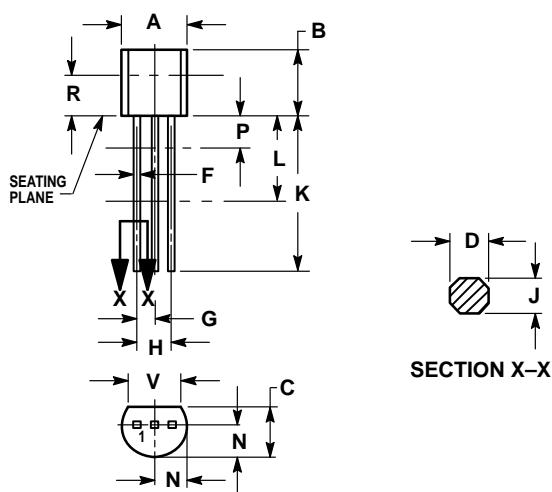


Figure 4. "On" Voltages

Figure 5. Maximum Forward Bias  
Safe Operating Area

## PACKAGE DIMENSIONS



- 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.

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	0.022	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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