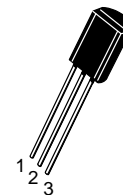
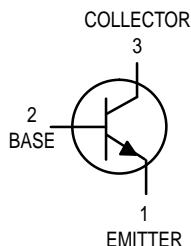


# One Watt High Voltage Transistor

## NPN Silicon

**MPSW42**

Motorola Preferred Device



CASE 29-05, STYLE 1  
TO-92 (TO-226AE)

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	300	Vdc
Collector–Base Voltage	$V_{CBO}$	300	Vdc
Emitter–Base Voltage	$V_{EBO}$	6.0	Vdc
Collector Current — Continuous	$I_C$	500	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	Watt mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	2.5 20	Watts 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	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage <sup>(1)</sup> ( $I_C = 1.0 \text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	300	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	300	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 100 \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	6.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = 200 \text{ Vdc}, I_E = 0$ )	$I_{CBO}$	—	0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 6.0 \text{ Vdc}, I_C = 0$ )	$I_{EBO}$	—	0.1	$\mu\text{Adc}$

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

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

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

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

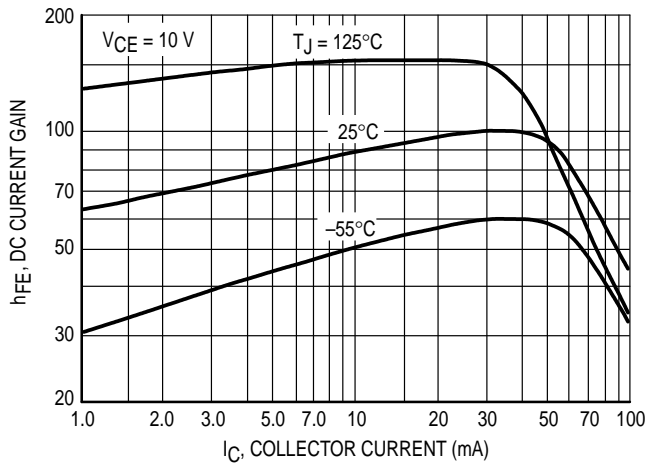


Figure 1. DC Current Gain

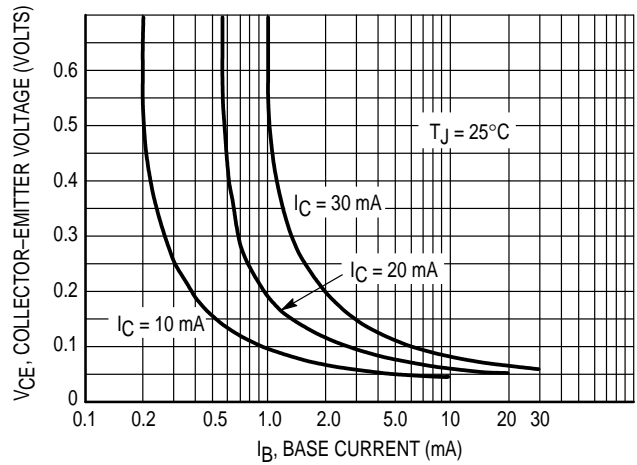


Figure 2. Collector Saturation Region

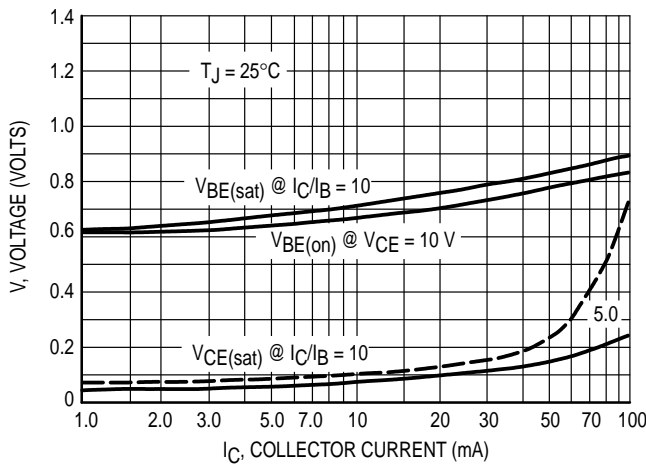


Figure 3. "On" Voltages

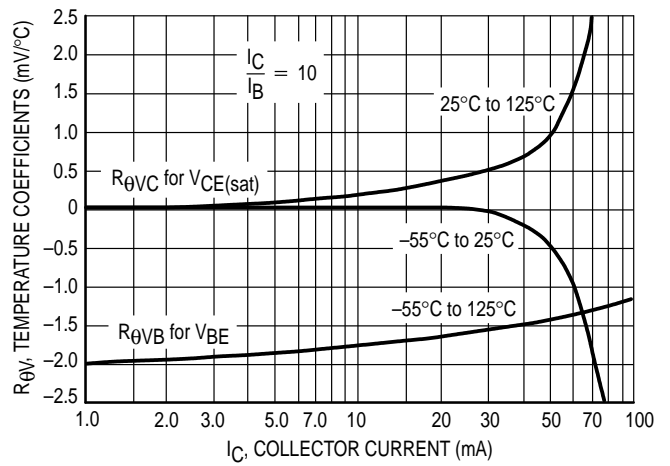


Figure 4. Temperature Coefficients

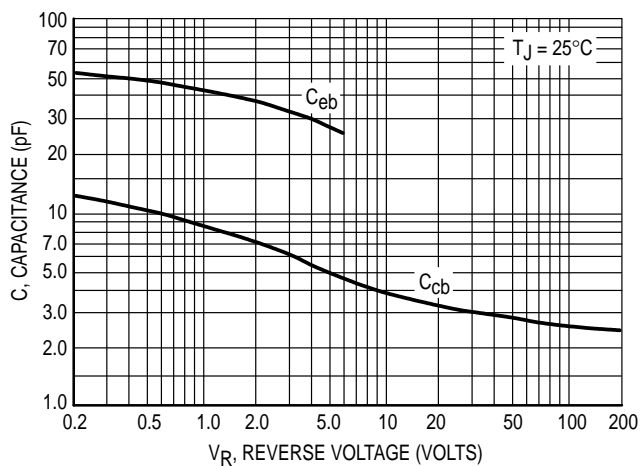


Figure 5. Capacitance

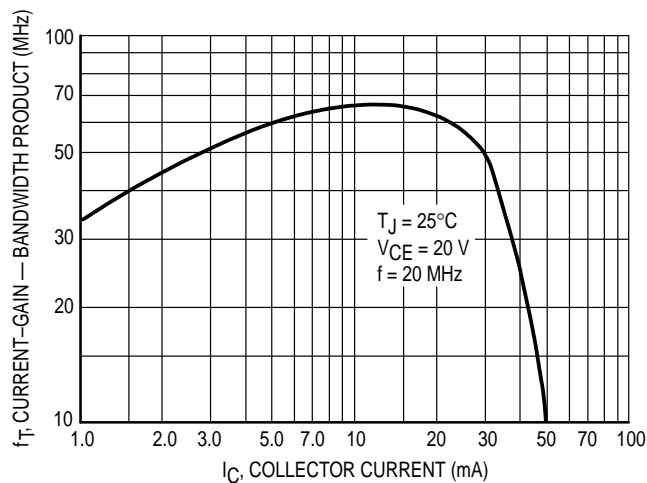


Figure 6. Current-Gain — Bandwidth Product

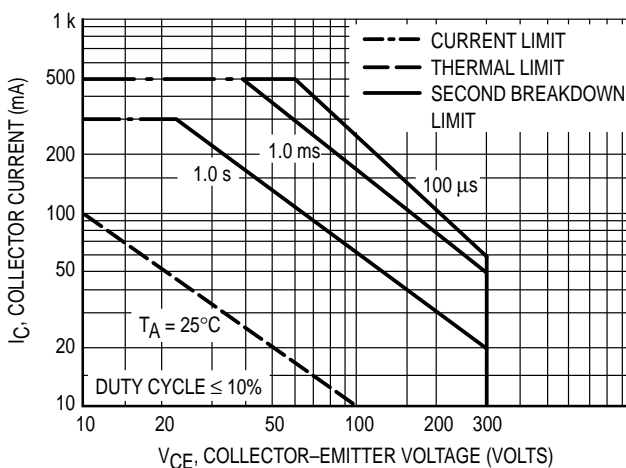
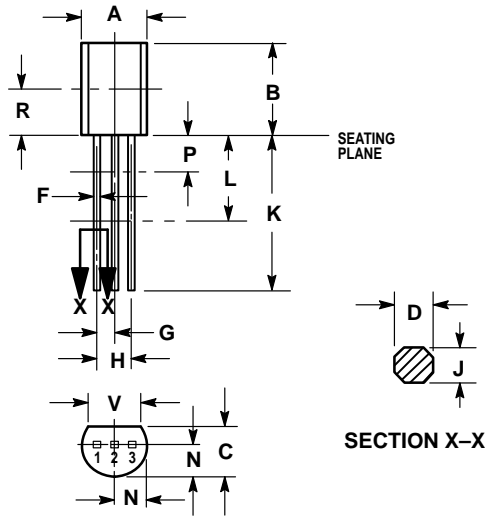


Figure 7. Active Region — Safe Operating Area

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. DIMENSIONS 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	4.44	5.21
B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.022	0.46	0.56
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	0.018	0.024	0.46	0.61
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	0.135	—	3.43	—
V	0.135	—	3.43	—

CASE 029-05  
(TO-226AE)  
ISSUE AD

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

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