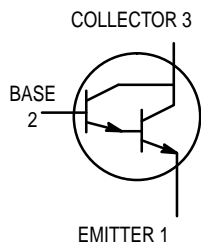
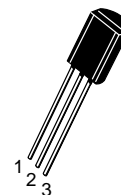


# One Watt Darlington Transistors

## NPN Silicon



**MPSW13**  
**MPSW14**



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

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CES}$	30	Vdc
Collector–Base Voltage	$V_{CBO}$	30	Vdc
Emitter–Base Voltage	$V_{EBO}$	10	Vdc
Collector Current — Continuous	$I_C$	1.0	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	Watts 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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	$^\circ\text{C/W}$

### 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 ( $I_C = 100 \mu\text{Adc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	30	—	Vdc
Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	100	nAdc
Emitter Cutoff Current ( $V_{EB} = 10 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	—	100	nAdc

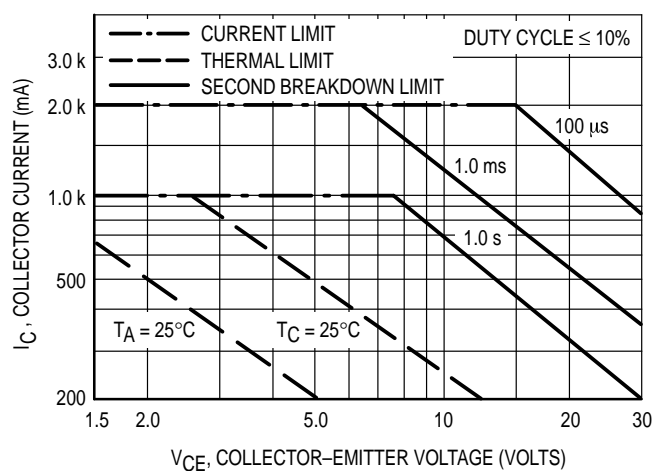
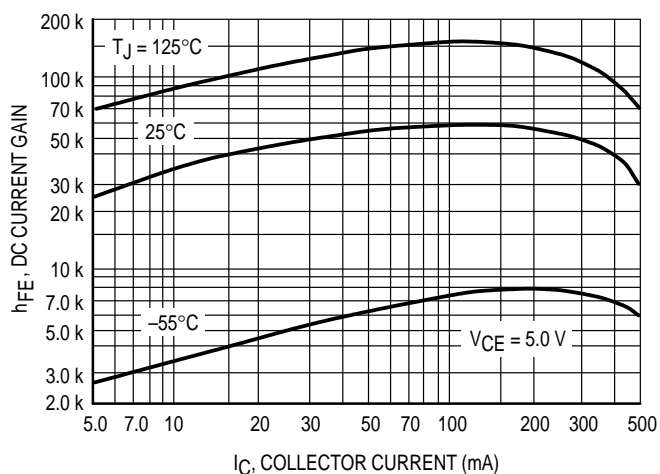
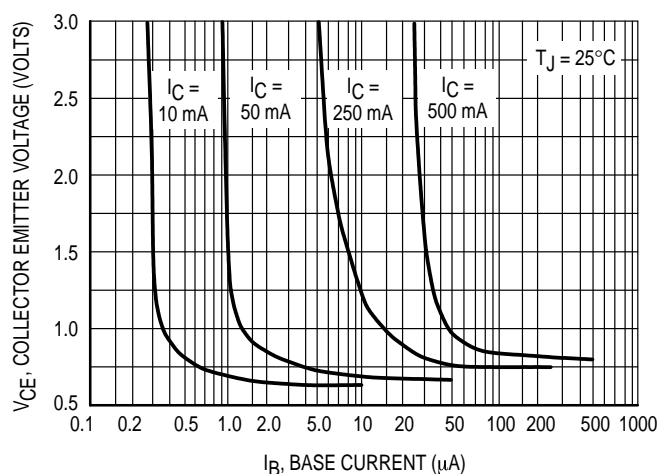


**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS(1)</b>				
DC Current Gain ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	5,000	—	—
MPSW13		10,000	—	
( $I_C = 100\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ )		10,000	—	
MPSW13		20,000	—	
Collector–Emitter Saturation Voltage ( $I_C = 100\text{ mA}$ , $I_B = 0.1\text{ mA}$ )	$V_{CE(sat)}$	—	1.5	Vdc
Base–Emitter On Voltage ( $I_C = 100\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$V_{BE(on)}$	—	2.0	Vdc

**SMALL-SIGNAL CHARACTERISTICS**

Current–Gain — Bandwidth Product(2) ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	125	—	MHz
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1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .2.  $f_T = |h_{fe}| \cdot f_{test}$ .**Figure 1. Active Region — Safe Operating Area****Figure 2. DC Current Gain****Figure 3. Collector Saturation Region**

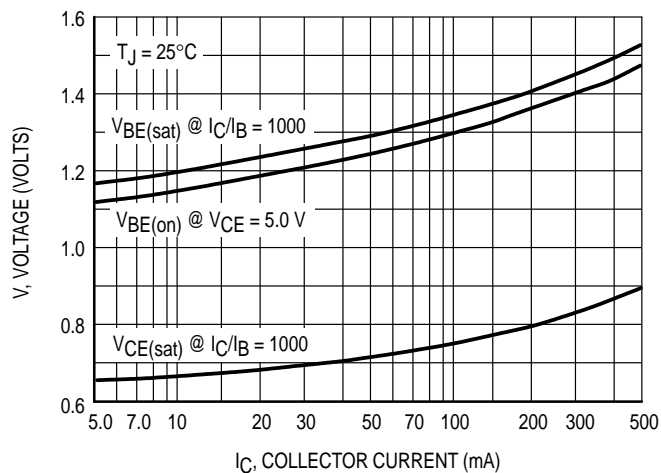


Figure 4. "ON" Voltages

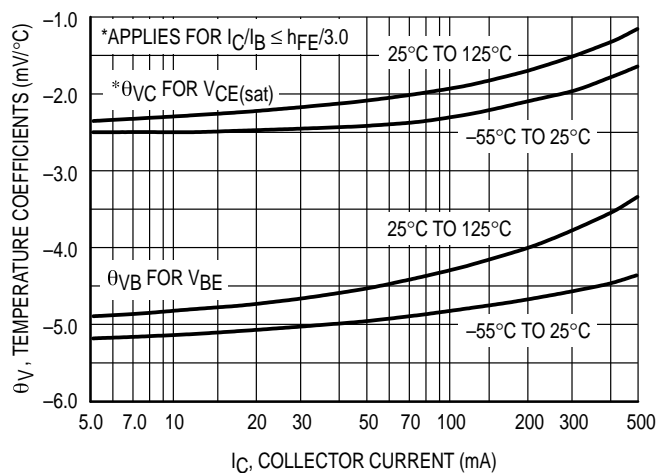


Figure 5. Temperature Coefficients

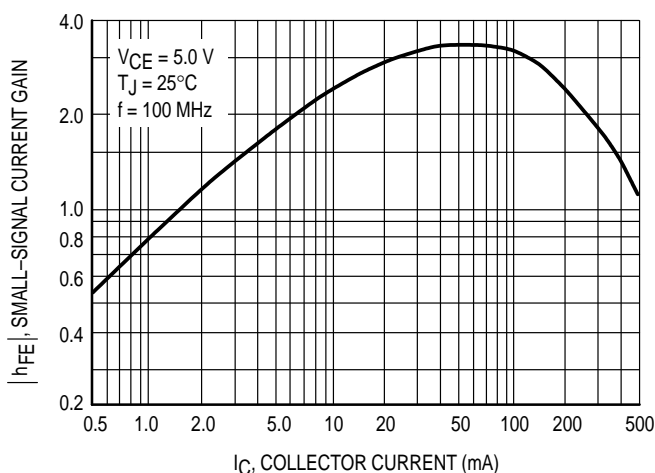


Figure 6. High Frequency Current Gain

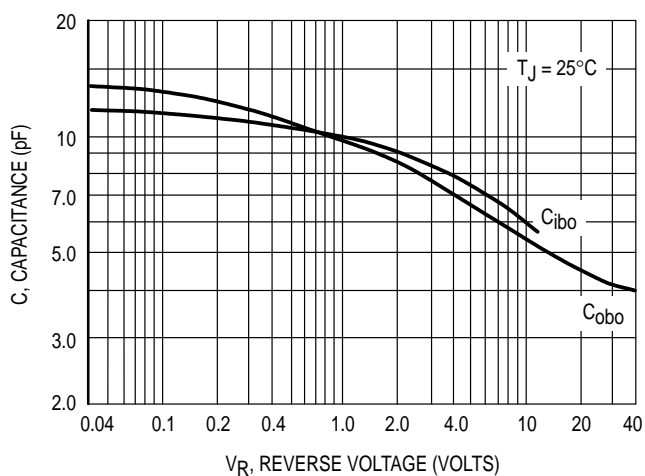
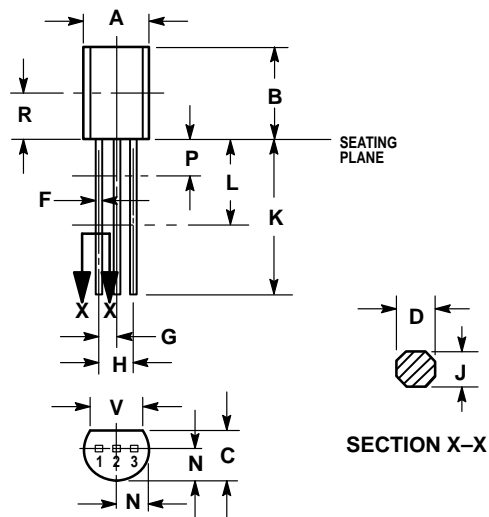


Figure 7. Capacitance

## 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
E	0.016	0.019	0.41	0.48
F	0.045	0.055	1.15	1.39
G	0.095	0.105	2.42	2.66
H	0.018	0.024	0.46	0.61
J	0.500	—	12.70	—
K	0.250	—	6.35	—
L	0.080	0.105	2.04	2.66
M	—	0.100	—	2.54
N	0.135	—	3.43	—
O	0.135	—	3.43	—

## STYLE 1:

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

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

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**MOTOROLA**

MPSW13/D

