

MPSW13

One Watt Darlington Transistor

NPN Silicon

Features

- Pb-Free Package is Available*

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°C	P_D	1.0 8.0	W mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	2.5 20	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	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	50	$^\circ\text{C}/\text{W}$

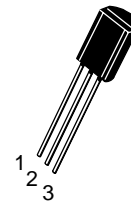
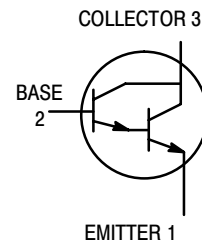
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

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



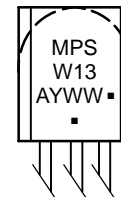
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TO-92 (TO-226)
CASE 29-10
STYLE 1

MARKING DIAGRAM



MPSW13 = Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
MPSW13RLRA	TO-92	2,000/Tape & Reel
MPSW13RLRAG	TO-92 (Pb-Free)	2,000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage ($I_C = 100\ \mu\text{A}$, $V_{BE} = 0$)	$V_{(BR)CES}$	30	–	Vdc
Collector Cutoff Current ($V_{CB} = 30\ \text{Vdc}$, $I_E = 0$)	I_{CBO}	–	100	nA dc
Emitter Cutoff Current ($V_{EB} = 10\ \text{Vdc}$, $I_C = 0$)	I_{EBO}	–	100	nA dc
ON CHARACTERISTICS (Note 1)				
DC Current Gain ($I_C = 10\ \text{mA}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 100\ \text{mA}$, $V_{CE} = 5.0\ \text{Vdc}$)	h_{FE}	5,000 10,000	– –	–
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 (Note 2) ($I_C = 10\ \text{mA}$, $V_{CE} = 5.0\ \text{Vdc}$, $f = 100\ \text{MHz}$)	f_T	125	–	MHz

1. Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
2. $f_T = |h_{fe}| \cdot f_{test}$.

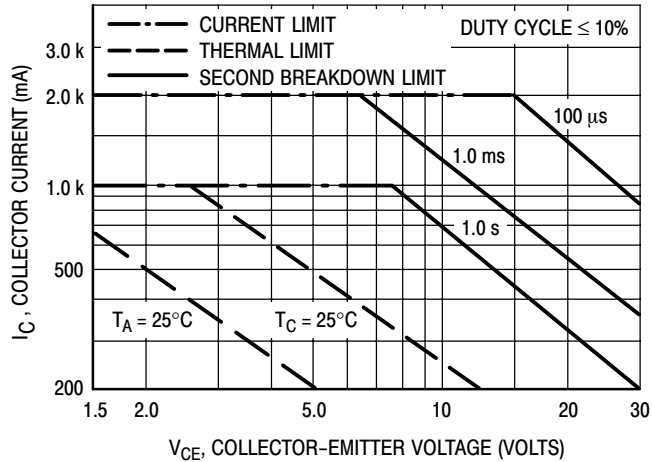


Figure 1. Active Region – Safe Operating Area

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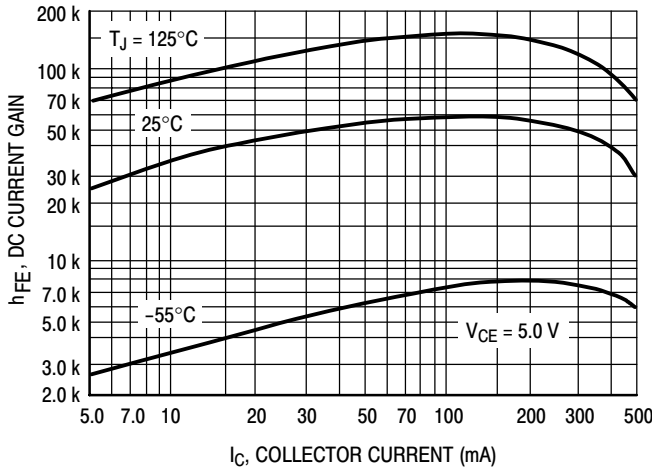


Figure 2. DC Current Gain

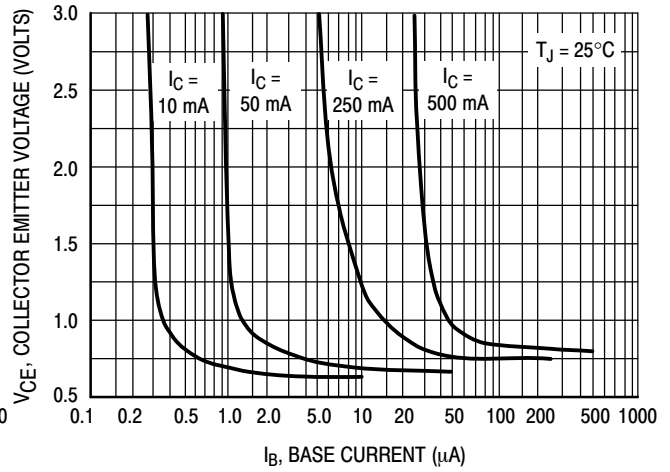


Figure 3. Collector Saturation Region

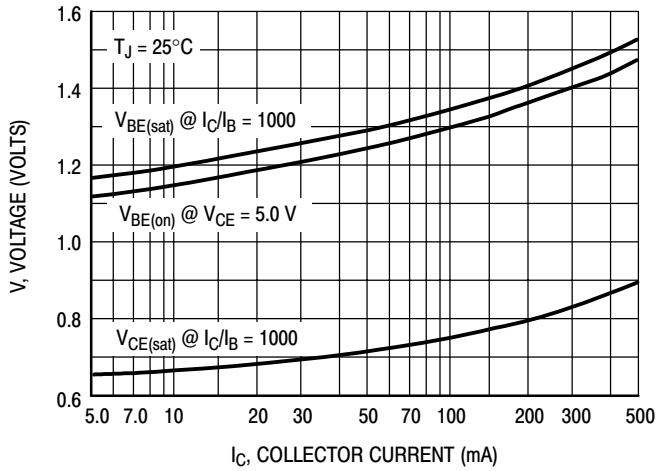


Figure 4. "ON" Voltages

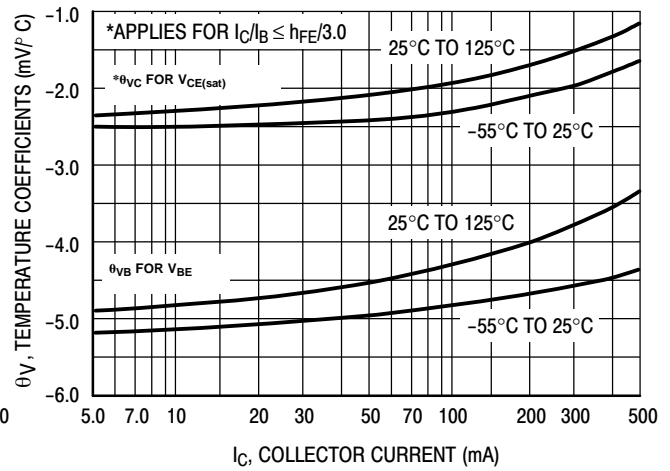


Figure 5. Temperature Coefficients

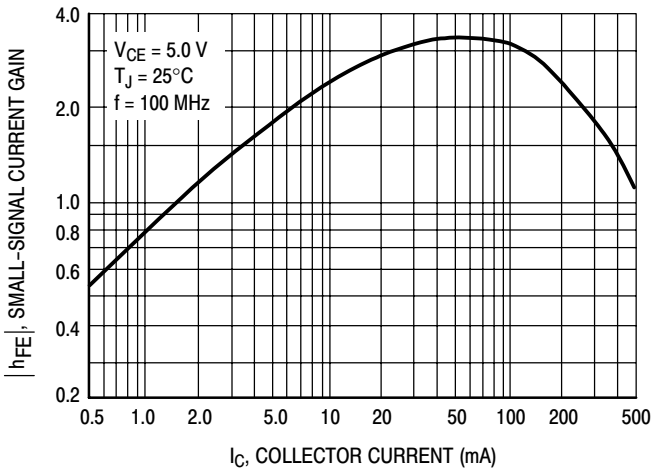


Figure 6. High Frequency Current Gain

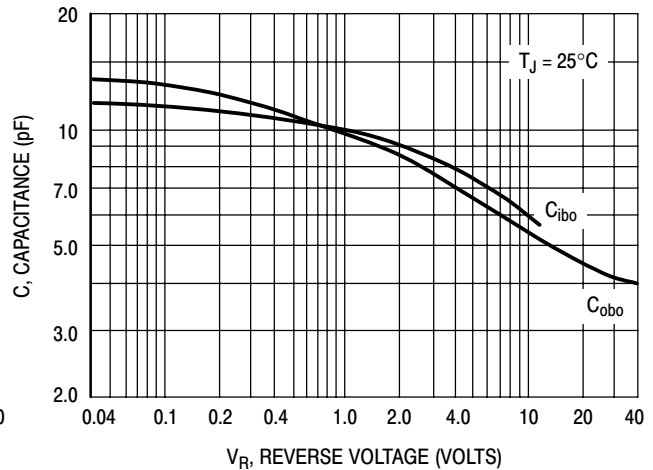
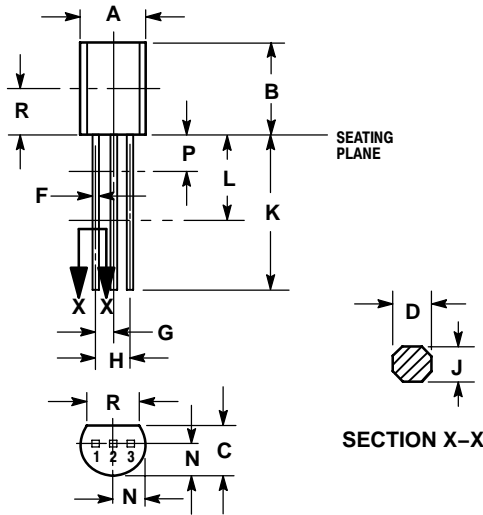


Figure 7. Capacitance

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PACKAGE DIMENSIONS

TO-92 (TO-226)
CASE 29-10
ISSUE AL



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	0.021	0.457	0.533
F	0.016	0.019	0.407	0.482
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	---

STYLE 1:

- PIN 1. EMITTER
- BASE
- COLLECTOR

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