

# MPSW51, MPSW51A

## One Watt High Current Transistors

### PNP Silicon

#### Features

- These Devices are Pb-Free and are RoHS Compliant\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MPSW51 MPSW51A	$V_{CEO}$	-30 -40	Vdc
Collector - Base Voltage MPSW51 MPSW51A	$V_{CBO}$	-40 -50	Vdc
Emitter - Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	-1000	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}/\text{W}$

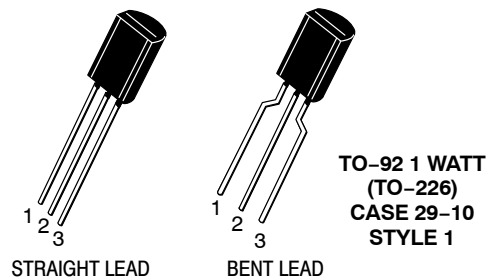
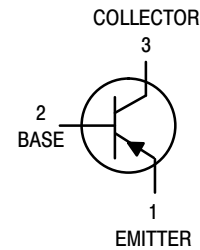
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

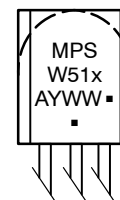


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#### MARKING DIAGRAM



- x = 51A Devices
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# MPSW51, MPSW51A

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector – Emitter Breakdown Voltage (Note 1) (I <sub>C</sub> = -1.0 mAdc, I <sub>B</sub> = 0)	MPSW51 MPSW51A	V <sub>(BR)CEO</sub>	-30 -40	-	Vdc
Collector – Base Breakdown Voltage (I <sub>C</sub> = -100 μAdc, I <sub>E</sub> = 0)	MPSW51 MPSW51A	V <sub>(BR)CBO</sub>	-40 -50	-	Vdc
Emitter – Base Breakdown Voltage (I <sub>E</sub> = -100 μAdc, I <sub>C</sub> = 0)		V <sub>(BR)EBO</sub>	-5.0	-	Vdc
Collector Cutoff Current (V <sub>CB</sub> = -30 Vdc, I <sub>E</sub> = 0) (V <sub>CB</sub> = -40 Vdc, I <sub>E</sub> = 0)	MPSW51 MPSW51A	I <sub>CBO</sub>	-	-0.1 -0.1	μAdc
Emitter Cutoff Current (V <sub>EB</sub> = -3.0 Vdc, I <sub>C</sub> = 0)		I <sub>EBO</sub>	-	-0.1	μAdc

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = -10 mAdc, V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -100 mAdc, V <sub>CE</sub> = -1.0 Vdc) (I <sub>C</sub> = -1000 mAdc, V <sub>CE</sub> = -1.0 Vdc)		h <sub>FE</sub>	55 60 50	-	-
Collector – Emitter Saturation Voltage (I <sub>C</sub> = -1000 mAdc, I <sub>B</sub> = -100 mAdc)		V <sub>CE(sat)</sub>	-	-0.7	Vdc
Base – Emitter On Voltage (I <sub>C</sub> = -1000 mAdc, V <sub>CE</sub> = -1.0 Vdc)		V <sub>BE(on)</sub>	-	-1.2	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain – Bandwidth Product (I <sub>C</sub> = -50 mAdc, V <sub>CE</sub> = -10 Vdc, f = 20 MHz)		f <sub>T</sub>	50	-	MHz
Output Capacitance (V <sub>CB</sub> = -10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz)		C <sub>obo</sub>	-	30	pF

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
MPSW51G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSW51AG	TO-92 (Pb-Free)	5000 Units / Bulk
MPSW51RLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSW51ARLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSW51ARLRPG	TO-92 (Pb-Free)	2000 / Ammo Pack

<sup>†</sup>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.

# MPSW51, MPSW51A

## TYPICAL CHARACTERISTICS

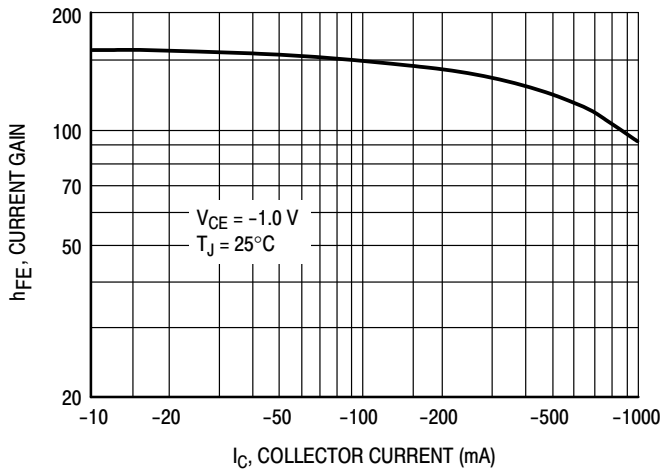


Figure 1. DC Current Gain

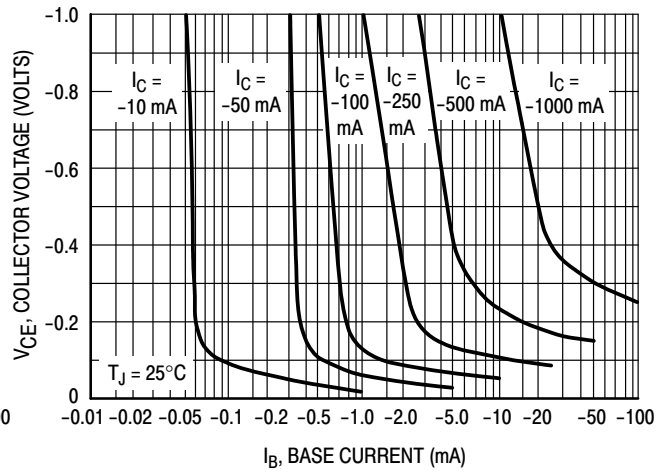


Figure 2. Collector Saturation Region

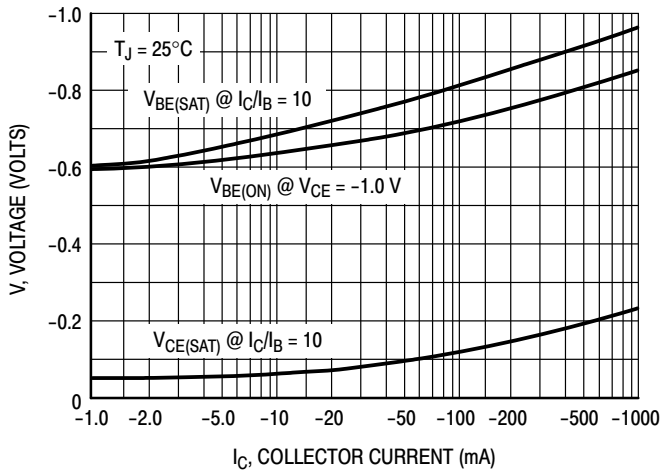


Figure 3. "ON" Voltages

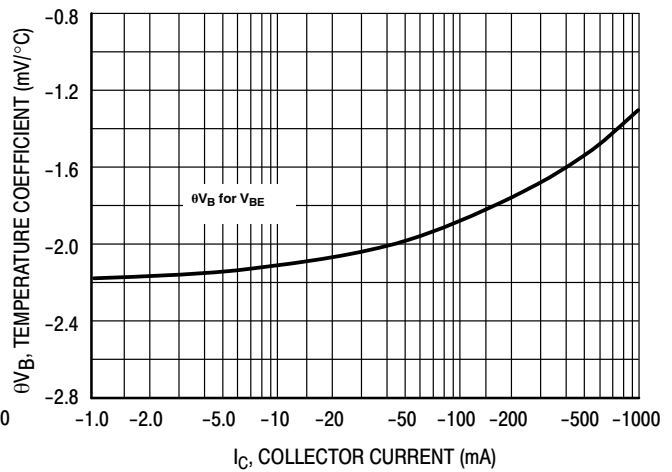


Figure 4. Temperature Coefficient

# MPSW51, MPSW51A

## TYPICAL CHARACTERISTICS

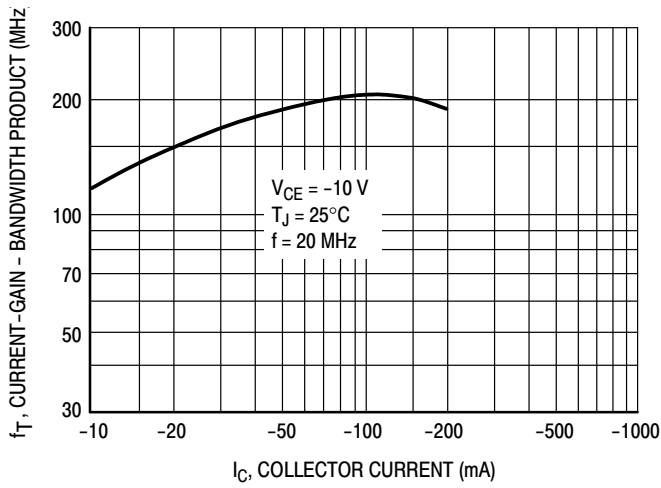


Figure 5. Current Gain — Bandwidth Product

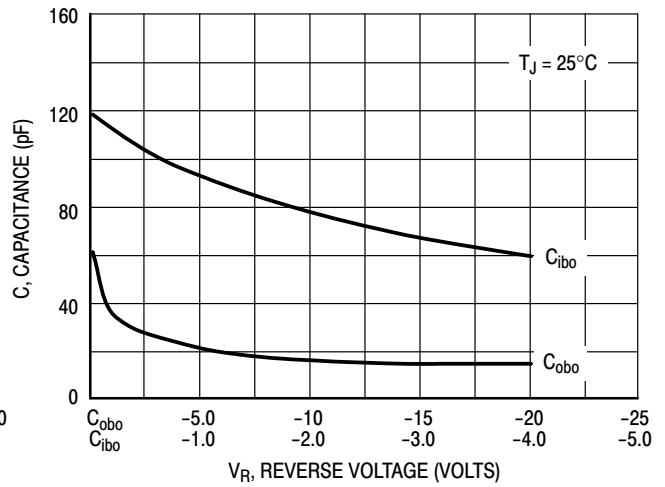


Figure 6. Capacitance

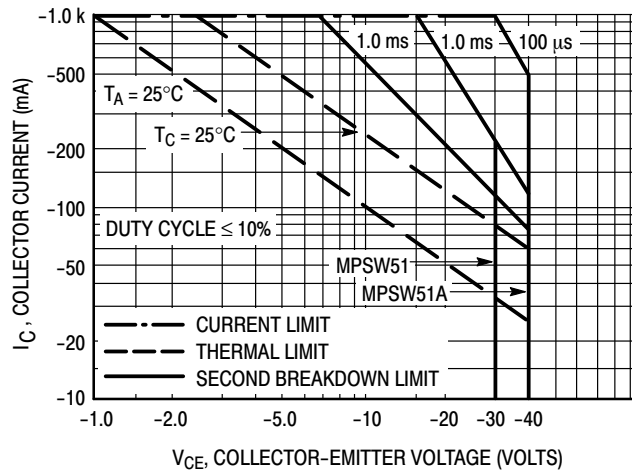


Figure 7. Active Region — Safe Operating Area

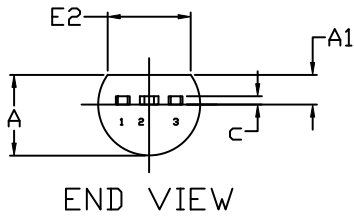
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**



**TO-92 (TO-226) 1 WATT**  
**CASE 29-10**  
**ISSUE D**

DATE 05 MAR 2021

**STRAIGHT LEAD**



**NOTES:**


1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR GATE PROTRUSIONS.
4. DIMENSION b AND b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 0.20. DIMENSION b2 LOCATED ABOVE THE DAMBAR PORTION OF MIDDLE LEAD.



DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	3.75	3.90	4.05
A1	1.28	1.43	1.58
b	0.38	0.465	0.55
b2	0.62	0.70	0.78
c	0.35	0.40	0.45
D	7.85	8.00	8.15
E	4.75	4.90	5.05
E2	3.90	---	---
e	1.27 BSC		
L	13.80	14.00	14.20

**STYLES AND MARKING ON PAGE 3**

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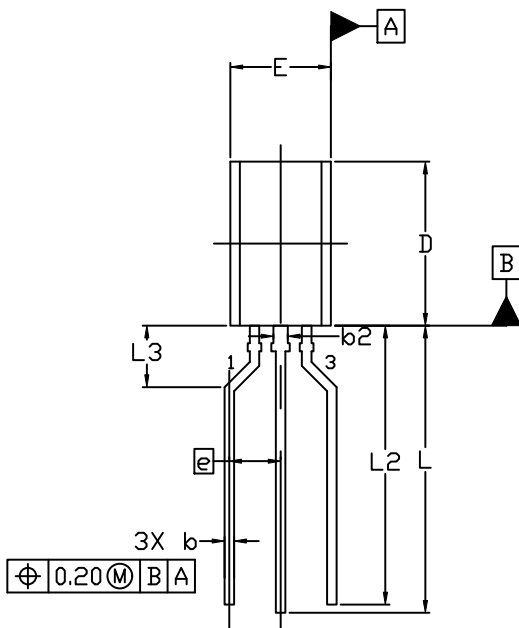
**TO-92 (TO-226) 1 WATT**  
**CASE 29-10**  
**ISSUE D**

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FORMED LEAD



END VIEW



TOP VIEW

NOTES:

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2. CONTROLLING DIMENSION: MILLIMETERS
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4. DIMENSION b AND b2 DOES NOT INCLUDE DAMBAR PROTRUSION. LEAD WIDTH INCLUDING PROTRUSION SHALL NOT EXCEED 0.20. DIMENSION b2 LOCATED ABOVE THE DAMBAR PORTION OF MIDDLE LEAD.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
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A1	1.28	1.43	1.58
b	0.38	0.465	0.55
b2	0.62	0.70	0.78
c	0.35	0.40	0.45
D	7.85	8.00	8.15
E	4.75	4.90	5.05
E2	3.90	---	---
e	2.50 BSC		
L	13.80	14.00	14.20
L2	13.20	13.60	14.00
L3	3.00 REF		

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**TO-92 (TO-226) 1 WATT  
CASE 29-10  
ISSUE D**

DATE 05 MAR 2021

- |   |  |  |   |   |
|---|--|--|---|---|
| <p>STYLE 1:<br/>PIN 1. EMITTER<br/>2. BASE<br/>3. COLLECTOR</p>             | <p>STYLE 2:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. COLLECTOR</p>                | <p>STYLE 3:<br/>PIN 1. ANODE<br/>2. ANODE<br/>3. CATHODE</p>               | <p>STYLE 4:<br/>PIN 1. CATHODE<br/>2. CATHODE<br/>3. ANODE</p>            | <p>STYLE 5:<br/>PIN 1. DRAIN<br/>2. SOURCE<br/>3. GATE</p>            |
| <p>STYLE 6:<br/>PIN 1. GATE<br/>2. SOURCE &amp; SUBSTRATE<br/>3. DRAIN</p>  | <p>STYLE 7:<br/>PIN 1. SOURCE<br/>2. DRAIN<br/>3. GATE</p>                     | <p>STYLE 8:<br/>PIN 1. DRAIN<br/>2. GATE<br/>3. SOURCE &amp; SUBSTRATE</p> | <p>STYLE 9:<br/>PIN 1. BASE 1<br/>2. EMITTER<br/>3. BASE 2</p>            | <p>STYLE 10:<br/>PIN 1. CATHODE<br/>2. GATE<br/>3. ANODE</p>          |
| <p>STYLE 11:<br/>PIN 1. ANODE<br/>2. CATHODE &amp; ANODE<br/>3. CATHODE</p> | <p>STYLE 12:<br/>PIN 1. MAIN TERMINAL 1<br/>2. GATE<br/>3. MAIN TERMINAL 2</p> | <p>STYLE 13:<br/>PIN 1. ANODE 1<br/>2. GATE<br/>3. CATHODE 2</p>           | <p>STYLE 14:<br/>PIN 1. EMITTER<br/>2. COLLECTOR<br/>3. BASE</p>          | <p>STYLE 15:<br/>PIN 1. ANODE 1<br/>2. CATHODE<br/>3. ANODE 2</p>     |
| <p>STYLE 16:<br/>PIN 1. ANODE<br/>2. GATE<br/>3. CATHODE</p>                | <p>STYLE 17:<br/>PIN 1. COLLECTOR<br/>2. BASE<br/>3. EMITTER</p>               | <p>STYLE 18:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. NOT CONNECTED</p>      | <p>STYLE 19:<br/>PIN 1. GATE<br/>2. ANODE<br/>3. CATHODE</p>              | <p>STYLE 20:<br/>PIN 1. NOT CONNECTED<br/>2. CATHODE<br/>3. ANODE</p> |
| <p>STYLE 21:<br/>PIN 1. COLLECTOR<br/>2. EMITTER<br/>3. BASE</p>            | <p>STYLE 22:<br/>PIN 1. SOURCE<br/>2. GATE<br/>3. DRAIN</p>                    | <p>STYLE 23:<br/>PIN 1. GATE<br/>2. SOURCE<br/>3. DRAIN</p>                | <p>STYLE 24:<br/>PIN 1. EMITTER<br/>2. COLLECTOR/ANODE<br/>3. CATHODE</p> | <p>STYLE 25:<br/>PIN 1. MT 1<br/>2. GATE<br/>3. MT 2</p>              |
| <p>STYLE 26:<br/>PIN 1. V<sub>CC</sub><br/>2. GROUND 2<br/>3. OUTPUT</p>    | <p>STYLE 27:<br/>PIN 1. MT<br/>2. SUBSTRATE<br/>3. MT</p>                      | <p>STYLE 28:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. GATE</p>               | <p>STYLE 29:<br/>PIN 1. NOT CONNECTED<br/>2. ANODE<br/>3. CATHODE</p>     | <p>STYLE 30:<br/>PIN 1. DRAIN<br/>2. GATE<br/>3. SOURCE</p>           |
| <p>STYLE 31:<br/>PIN 1. GATE<br/>2. DRAIN<br/>3. SOURCE</p>                 | <p>STYLE 32:<br/>PIN 1. BASE<br/>2. COLLECTOR<br/>3. EMITTER</p>               | <p>STYLE 33:<br/>PIN 1. RETURN<br/>2. INPUT<br/>3. OUTPUT</p>              | <p>STYLE 34:<br/>PIN 1. INPUT<br/>2. GROUND<br/>3. LOGIC</p>              | <p>STYLE 35:<br/>PIN 1. GATE<br/>2. COLLECTOR<br/>3. EMITTER</p>      |

**GENERIC  
MARKING DIAGRAM\***



- XXXX = Specific Device Code  
 A = Assembly Location  
 L = Wafer Lot  
 Y = Year  
 W = Work Week  
 ▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

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