



# THE DATASHEET OF MPSW01ARLRAG



# MPSW01, MPSW01A

## One Watt High Current Transistors

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage MPSW01 MPSW01A	$V_{CEO}$	30 40	Vdc
Collector - Base Voltage MPSW01 MPSW01A	$V_{CBO}$	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	W 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	$^\circ\text{C}/\text{W}$

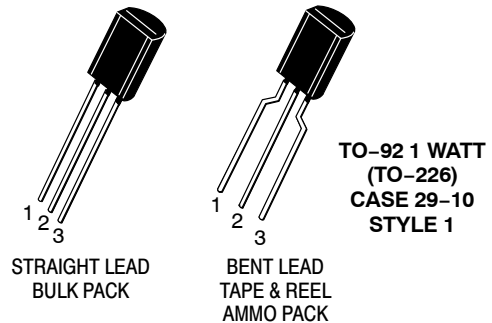
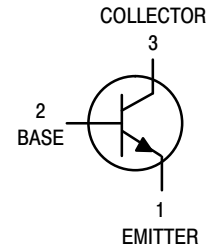
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

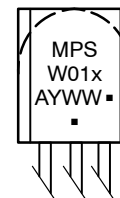


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#### MARKING DIAGRAM



- x = 01A 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.

# MPSW01, MPSW01A

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Breakdown Voltage (Note 1) ( $I_C = 10\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	30 40	- -	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100\text{ }\mu\text{Adc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	40 50	- -	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100\text{ }\mu\text{Adc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	5.0	-	Vdc
Collector Cutoff Current ( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 40\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	- -	0.1 0.1	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 3.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	-	0.1	$\mu\text{Adc}$

## ON CHARACTERISTICS (Note 1)

DC Current Gain ( $I_C = 10\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 1000\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	55 60 50	- - -	-
Collector-Emitter Saturation Voltage ( $I_C = 1000\text{ mAdc}$ , $I_B = 100\text{ mAdc}$ )	$V_{CE(sat)}$	-	0.5	Vdc
Base-Emitter On Voltage ( $I_C = 1000\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$V_{BE(on)}$	-	1.2	Vdc

## SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ( $I_C = 50\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 20\text{ MHz}$ )	$f_T$	50	-	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	-	20	pF

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

## ORDERING INFORMATION

Device	Package	Shipping†
MPSW01	TO-92	5000 Units / Bulk
MPSW01G	TO-92 (Pb-Free)	5000 Units / Bulk
MPSW01AG	TO-92 (Pb-Free)	5000 Units / Bulk
MPSW01ARLRAG	TO-92 (Pb-Free)	2000 / Tape & Reel
MPSW01ARLRPG	TO-92 (Pb-Free)	2000 / Tape & Ammo Box

†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.

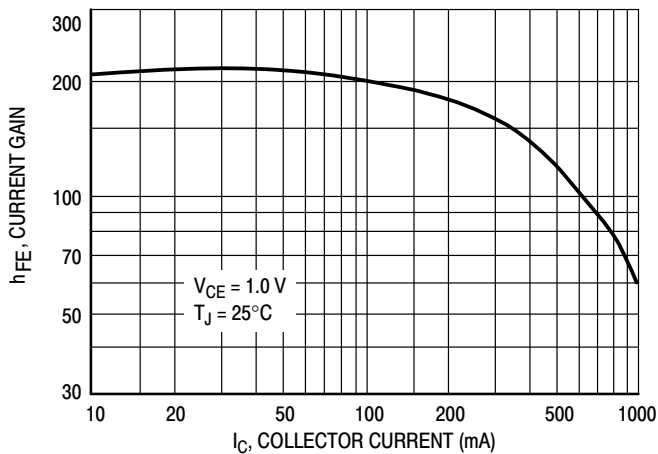


Figure 1. DC Current Gain

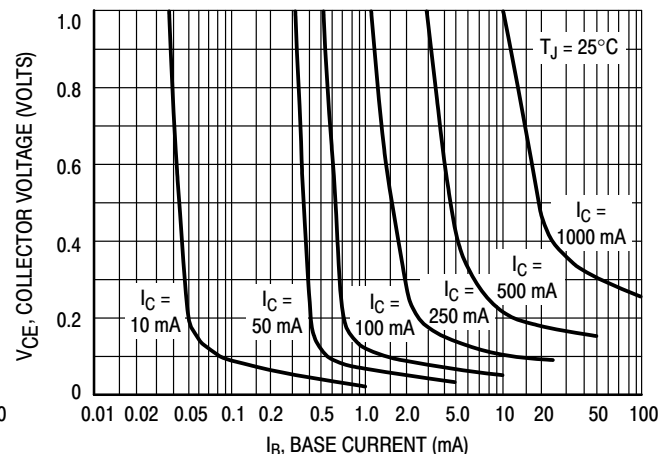


Figure 2. Collector Saturation Region

# MPSW01, MPSW01A

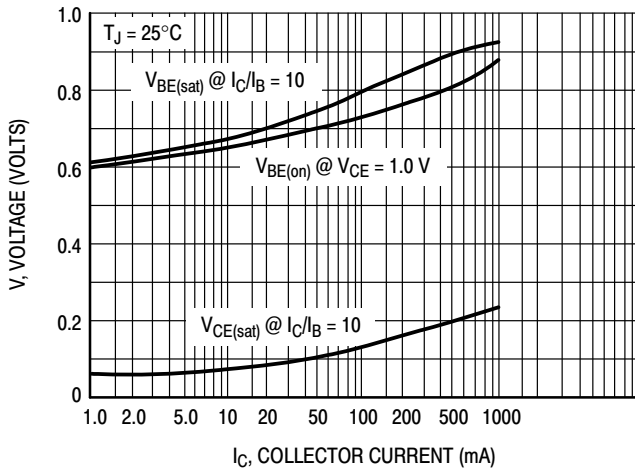


Figure 3. "ON" Voltages

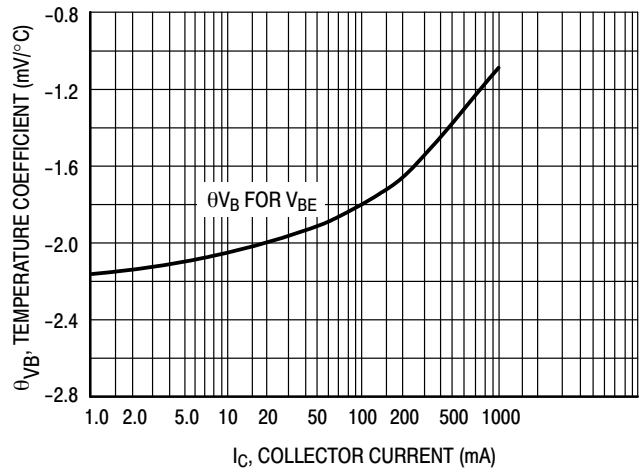


Figure 4. Temperature Coefficient

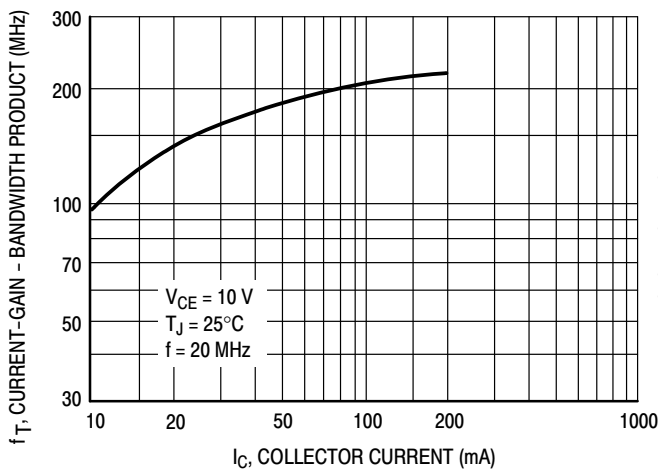


Figure 5. Current Gain — Bandwidth Product

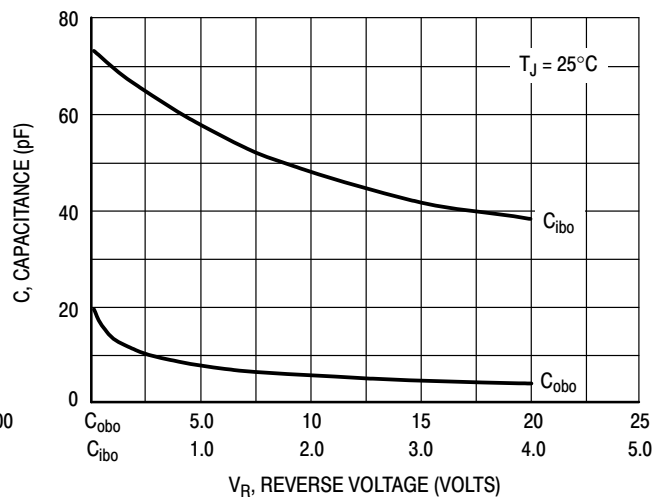


Figure 6. Capacitance

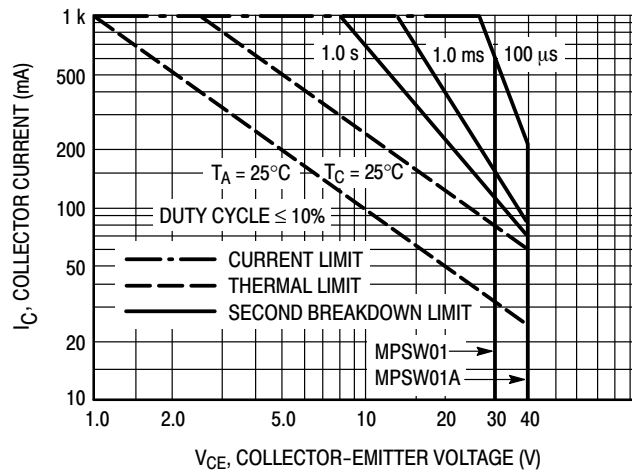
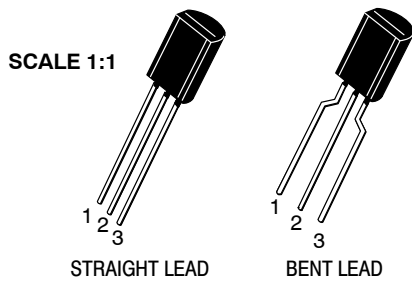


Figure 7. Active Region — Safe Operating Area

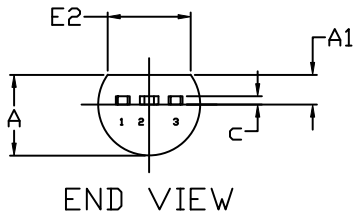
**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**



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

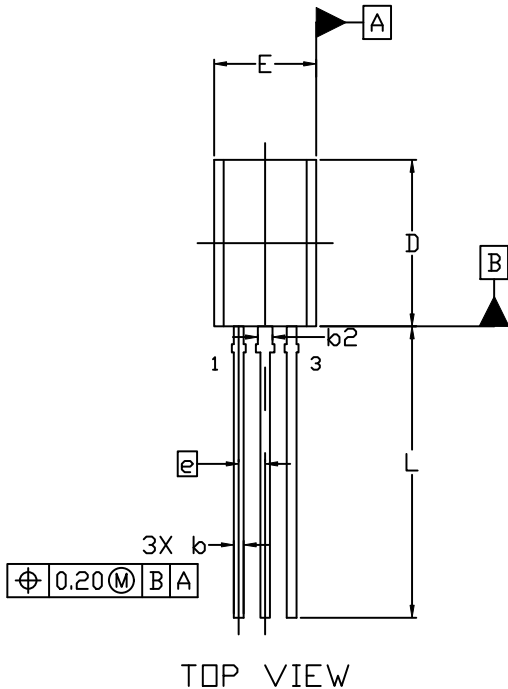
DATE 05 MAR 2021

**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**

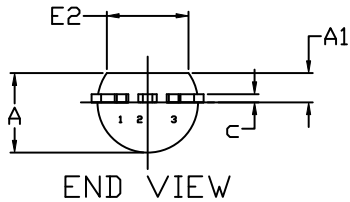
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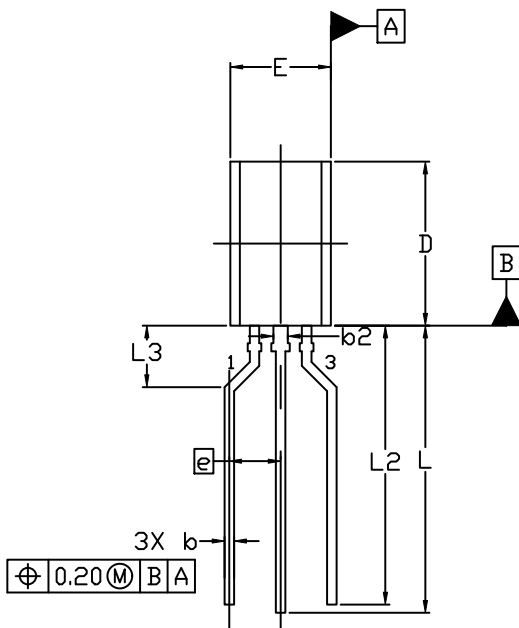
**TO-92 (TO-226) 1 WATT**  
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FORMED LEAD



END VIEW



TOP VIEW


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.
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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	2.50 BSC		
L	13.80	14.00	14.20
L2	13.20	13.60	14.00
L3	3.00 REF		

**STYLES AND MARKING ON PAGE 3**

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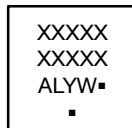
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**TO-92 (TO-226) 1 WATT  
CASE 29-10  
ISSUE D**

DATE 05 MAR 2021

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

**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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