

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°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 | $^\circ\text{C}/\text{W}$ |

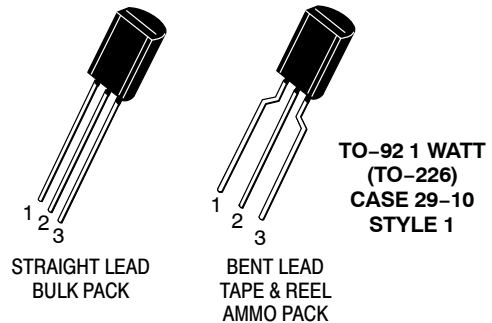
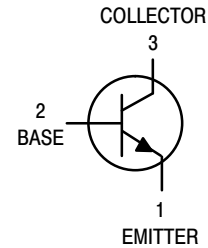
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

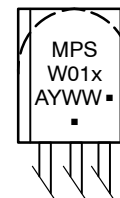


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MARKING DIAGRAM



- 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 |
|--|---------------|----------|------------|-----------------|
| OFF CHARACTERISTICS | | | | |
| 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 | μAdc |
| Emitter Cutoff Current ($V_{EB} = 3.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | - | 0.1 | μAdc |

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.

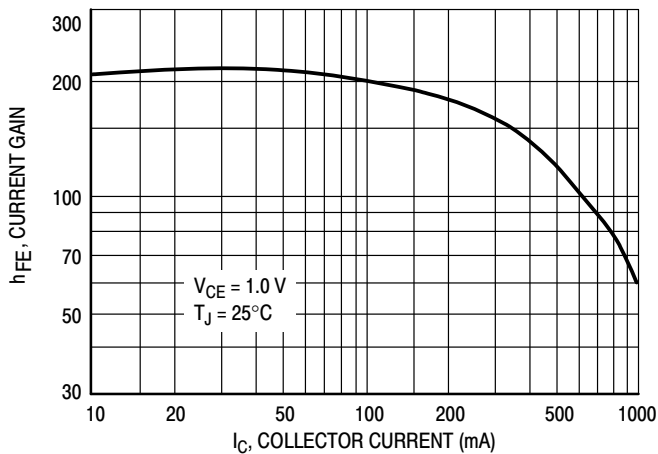


Figure 1. DC Current Gain

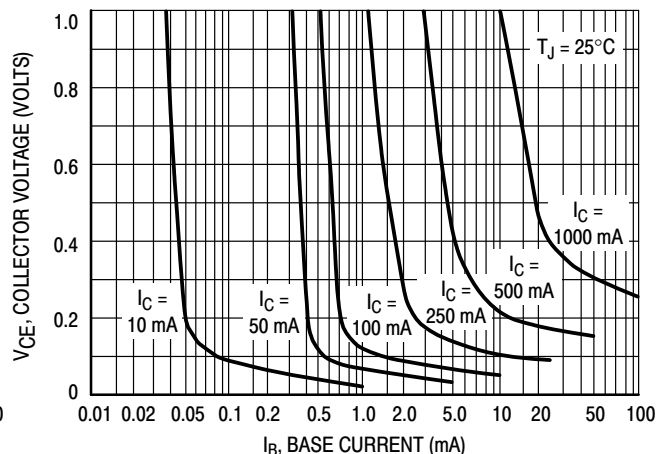


Figure 2. Collector Saturation Region

MPSW01, MPSW01A

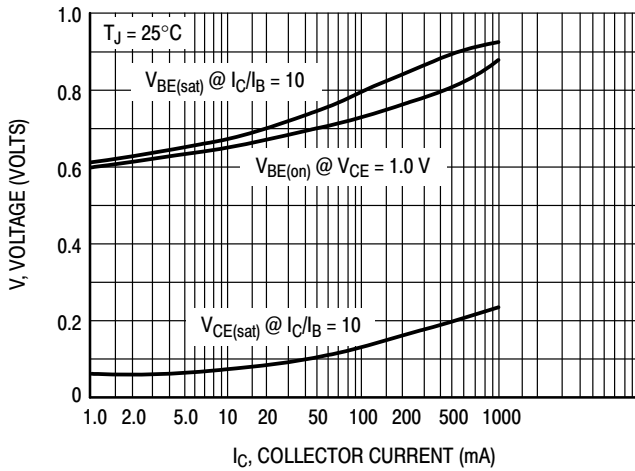


Figure 3. "ON" Voltages

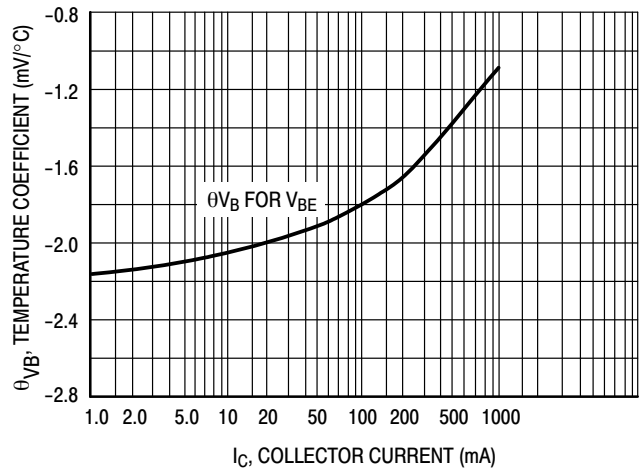


Figure 4. Temperature Coefficient

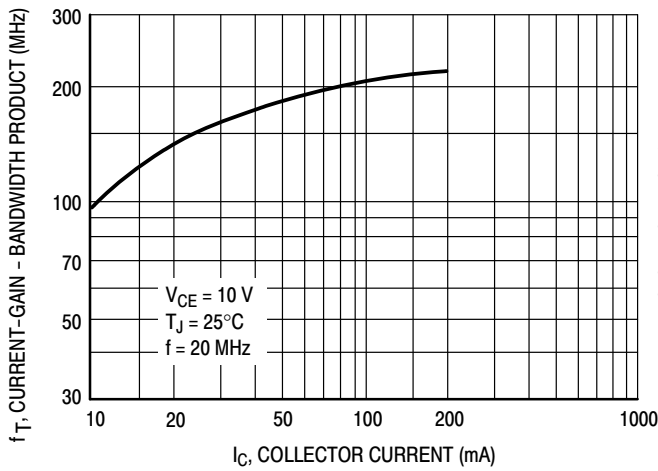


Figure 5. Current Gain — Bandwidth Product

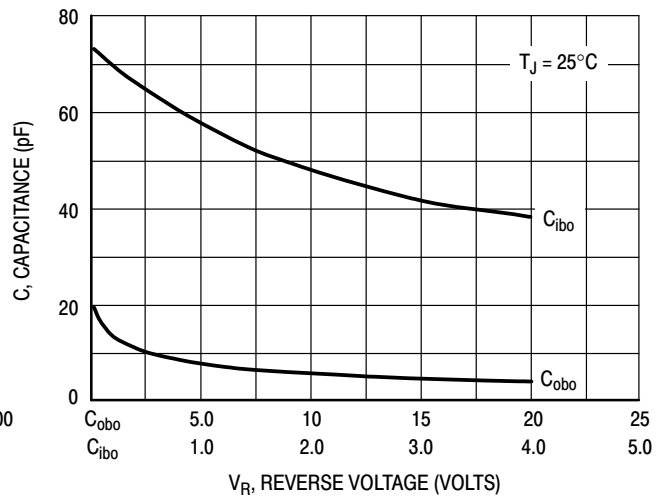


Figure 6. Capacitance

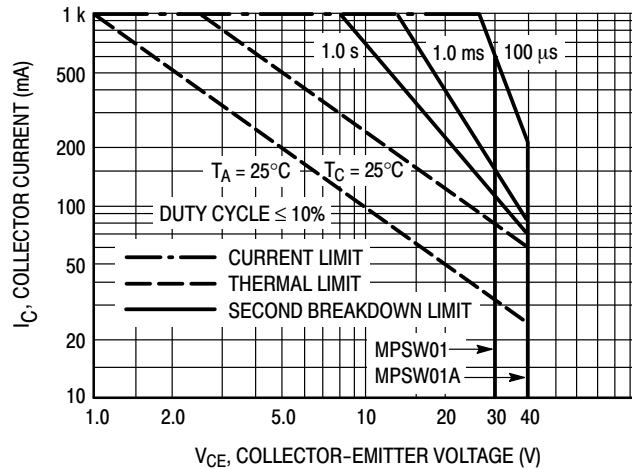
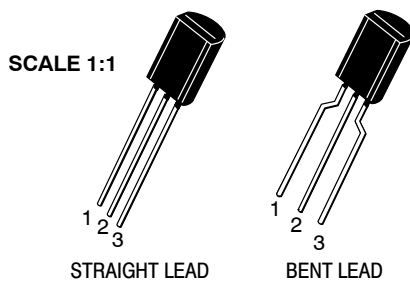


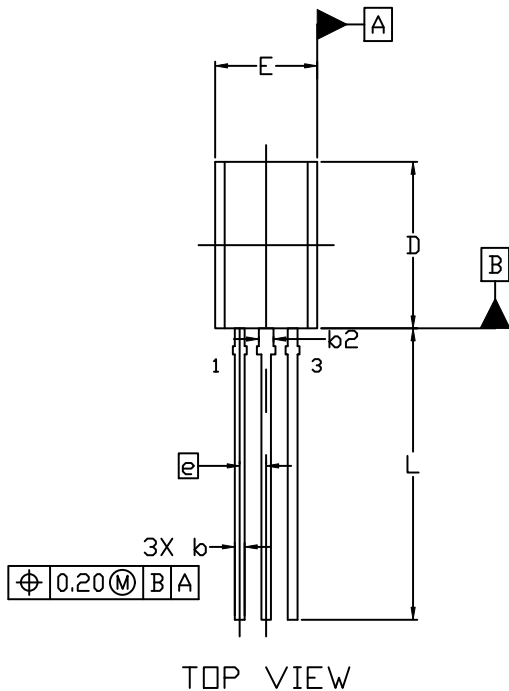
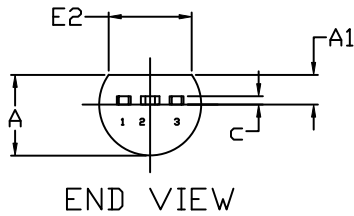
Figure 7. Active Region — Safe Operating Area



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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

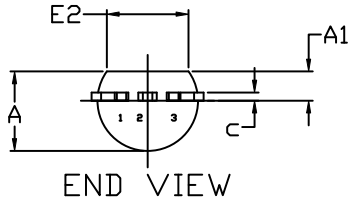
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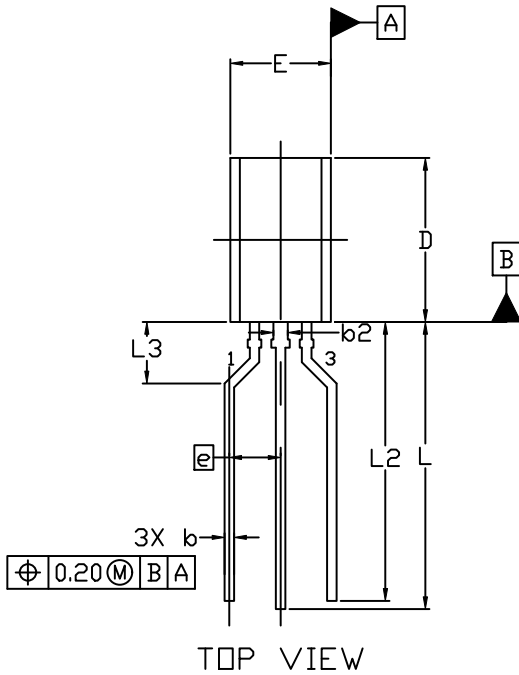
DATE 05 MAR 2021

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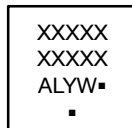
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- | | | | | |
|---|--|--|---|---|
| STYLE 1: PIN 1. EMITTER 2. BASE 3. COLLECTOR | STYLE 2: PIN 1. BASE 2. EMITTER 3. COLLECTOR | STYLE 3: PIN 1. ANODE 2. ANODE 3. CATHODE | STYLE 4: PIN 1. CATHODE 2. CATHODE 3. ANODE | STYLE 5: PIN 1. DRAIN 2. SOURCE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