

# MPSW42

## One Watt High Voltage Transistor

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

| Rating   | Symbol         | Value       | Unit                      |
|--|----------------|-------------|---------------------------|
| Collector - Emitter Voltage  | $V_{CEO}$      | 300         | Vdc                       |
| Collector - Base Voltage   | $V_{CBO}$      | 300         | Vdc                       |
| Emitter - Base Voltage   | $V_{EBO}$      | 6.0         | Vdc                       |
| Collector Current - Continuous   | $I_C$          | 500         | mAdc                      |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.0<br>8.0  | W<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 2.5<br>20   | W<br>mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range                                       | $T_J, T_{stg}$ | -55 to +150 | $^\circ\text{C}$          |

#### THERMAL CHARACTERISTICS

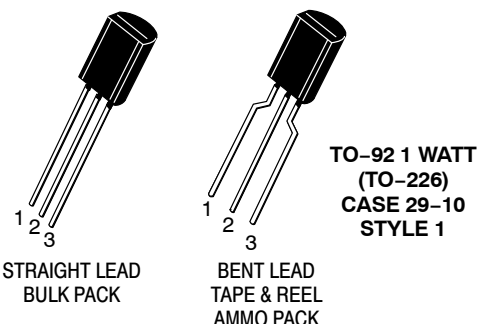
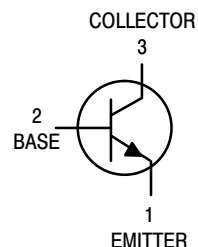
| Characteristic                          | Symbol          | Max | Unit                      |
|---|-----------------|-----|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 125 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 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.

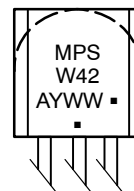


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#### MARKING DIAGRAM



MPSW42 = 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†        |
|-------------|--------------------|------------------|
| MPSW42      | TO-92              | 5000 Units/Box   |
| MPSW42G     | TO-92<br>(Pb-Free) | 5000 Units/Box   |
| MPSW42RLRA  | TO-92              | 2000/Tape & Reel |
| MPSW42RLRAG | TO-92<br>(Pb-Free) | 2000/Tape & Reel |

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

†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.

# MPSW42

## 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)<br>(I <sub>C</sub> = 1.0 mA <sub>dc</sub> , I <sub>B</sub> = 0)   | V <sub>(BR)CEO</sub> | 300            | –           | V <sub>dc</sub>  |
| Collector–Base Breakdown Voltage<br>(I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0)   | V <sub>(BR)CBO</sub> | 300            | –           | V <sub>dc</sub>  |
| Emitter–Base Breakdown Voltage<br>(I <sub>E</sub> = 100 μA <sub>dc</sub> , I <sub>C</sub> = 0)   | V <sub>(BR)EBO</sub> | 6.0            | –           | V <sub>dc</sub>  |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 200 V <sub>dc</sub> , I <sub>E</sub> = 0)   | I <sub>CBO</sub>     | –              | 0.1         | μA <sub>dc</sub> |
| Emitter Cutoff Current<br>(V <sub>EB</sub> = 6.0 V <sub>dc</sub> , I <sub>C</sub> = 0)   | I <sub>EBO</sub>     | –              | 0.1         | μA <sub>dc</sub> |
| <b>ON CHARACTERISTICS</b>  |                      |                |             |                  |
| DC Current Gain<br>(I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )<br>(I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> )<br>(I <sub>C</sub> = 30 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> ) | h <sub>FE</sub>      | 25<br>40<br>40 | –<br>–<br>– | –                |
| Collector–Emitter Saturation Voltage<br>(I <sub>C</sub> = 20 mA <sub>dc</sub> , I <sub>B</sub> = 2.0 mA <sub>dc</sub> )  | V <sub>CE(sat)</sub> | –              | 0.5         | V <sub>dc</sub>  |
| Base–Emitter Saturation Voltage<br>(I <sub>C</sub> = 20 mA <sub>dc</sub> , I <sub>B</sub> = 2.0 mA <sub>dc</sub> )   | V <sub>BE(sat)</sub> | –              | 0.9         | V <sub>dc</sub>  |
| <b>SMALL-SIGNAL CHARACTERISTICS</b>  |                      |                |             |                  |
| Current–Gain – Bandwidth Product<br>(I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 20 V <sub>dc</sub> , f = 20 MHz)   | f <sub>T</sub>       | 50             | –           | MHz              |
| Collector Capacitance<br>(V <sub>CB</sub> = 20 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)  | C <sub>cb</sub>      | –              | 3.0         | pF               |

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

# MPSW42

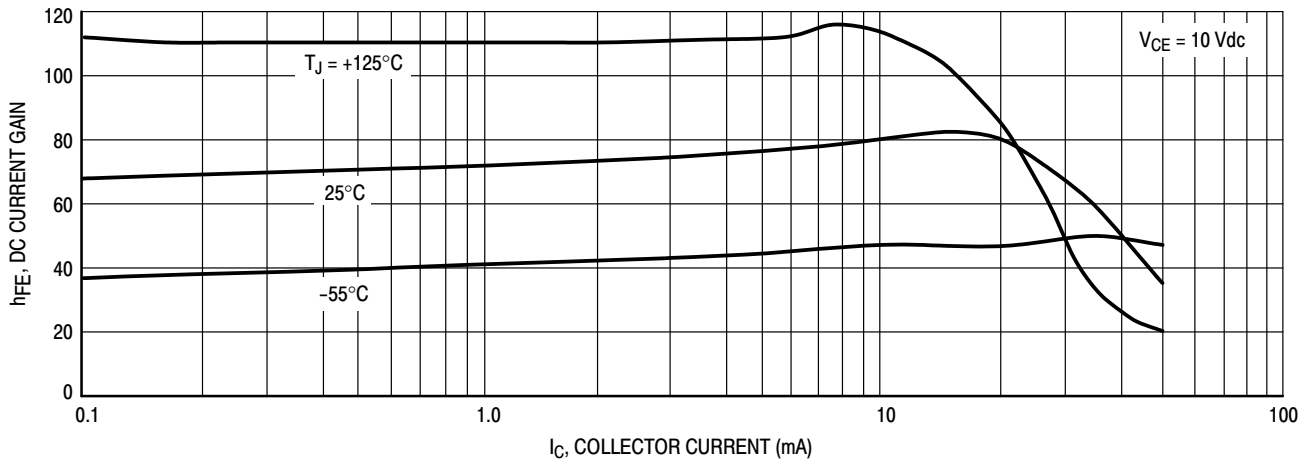


Figure 1. DC Current Gain

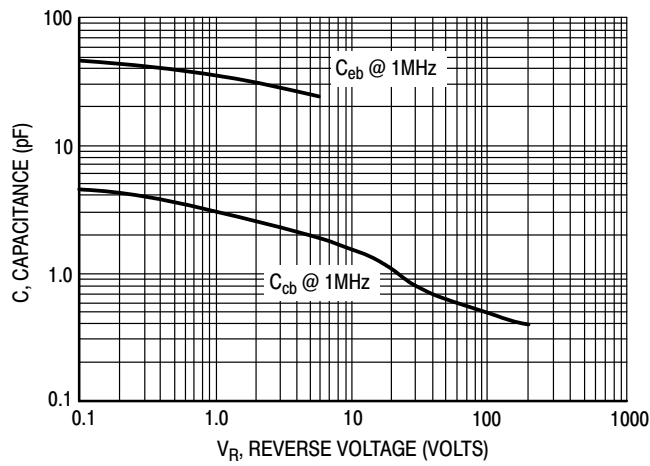


Figure 2. Capacitance

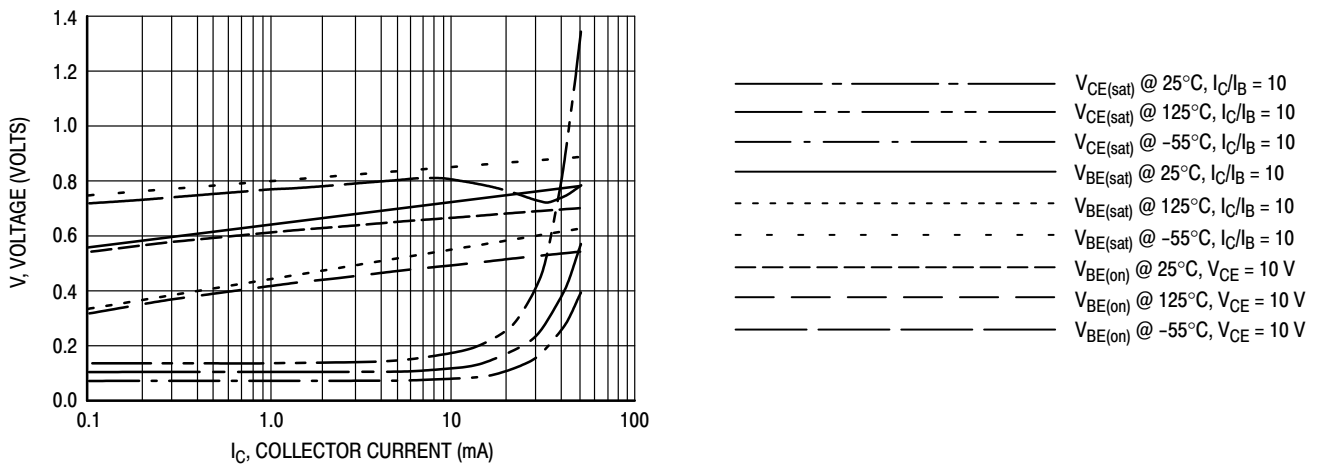
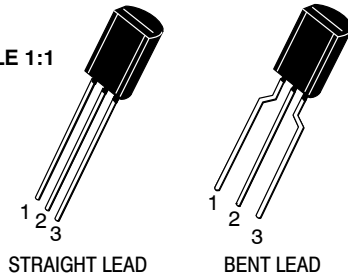


Figure 3. "ON" Voltages

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



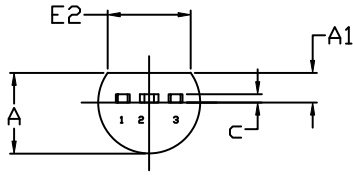
SCALE 1:1



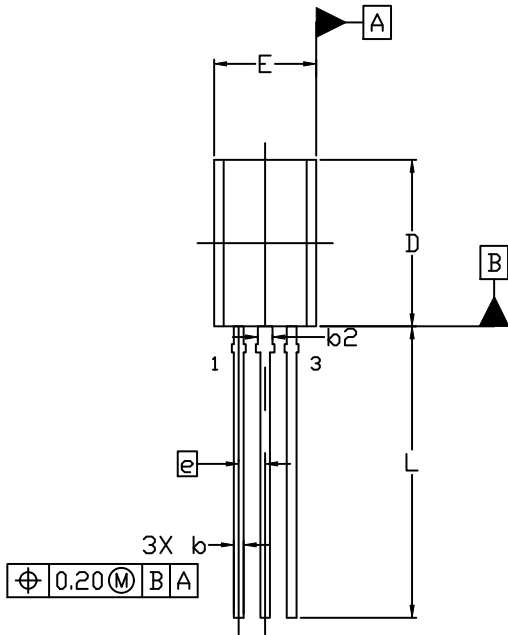
**TO-92 (TO-226) 1 WATT**  
**CASE 29-10**  
**ISSUE D**

DATE 05 MAR 2021

**STRAIGHT 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.
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**

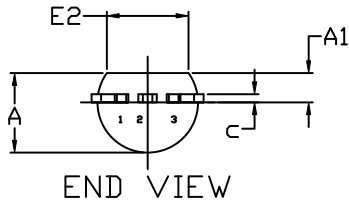
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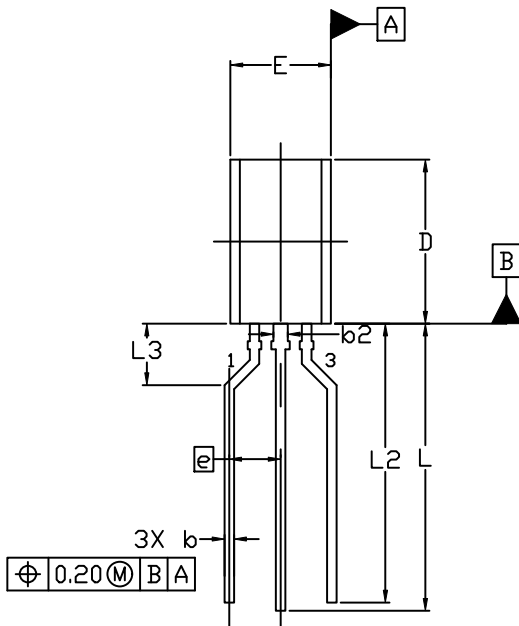
**TO-92 (TO-226) 1 WATT**  
**CASE 29-10**  
**ISSUE D**

DATE 05 MAR 2021

FORMED LEAD



END VIEW



TOP VIEW


NOTES:

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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    |       |       |

**STYLES AND MARKING ON PAGE 3**

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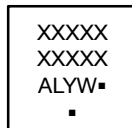
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**TO-92 (TO-226) 1 WATT  
CASE 29-10  
ISSUE D**

DATE 05 MAR 2021

- |   |  |  |   |   |
|---|--|--|---|---|
| <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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