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# MPS918, MPS3563

MPS918 is a Preferred Device

## Amplifier Transistors

### NPN Silicon

#### Features

- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS

| Rating                                                                                 | Symbol         | Value       | Unit                       |
|----------------------------------------------------------------------------------------|----------------|-------------|----------------------------|
| Collector – Emitter Voltage<br>MPS918<br>MPS3563                                       | $V_{CEO}$      | 15<br>12    | Vdc                        |
| Collector – Base Voltage<br>MPS918<br>MPS3563                                          | $V_{CBO}$      | 30<br>30    | Vdc                        |
| Emitter – Base Voltage<br>MPS918<br>MPS3563                                            | $V_{EBO}$      | 3.0<br>2.0  | Vdc                        |
| Collector Current – Continuous                                                         | $I_C$          | 50          | mA <sub>dc</sub>           |
| Total Device Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 350<br>2.8  | mW<br>mW/ $^\circ\text{C}$ |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 0.85<br>6.8 | W<br>mW/ $^\circ\text{C}$  |
| Operating and Storage Junction<br>Temperature Range                                    | $T_J, T_{stg}$ | -55 to +150 | $^\circ\text{C}$           |

#### THERMAL CHARACTERISTICS

| Characteristic                                      | Symbol          | Max | Unit               |
|-----------------------------------------------------|-----------------|-----|--------------------|
| Thermal Resistance, Junction-to-Ambient<br>(Note 1) | $R_{\theta JA}$ | 357 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case                | $R_{\theta JC}$ | 147 | $^\circ\text{C/W}$ |

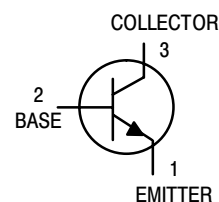
Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur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

1.  $R_{\theta JA}$  is measured with the device soldered into a typical printed circuit board.

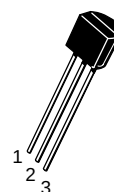


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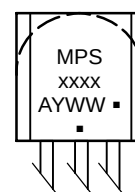
<http://onsemi.com>



#### MARKING DIAGRAM



TO-92  
CASE 29-11  
STYLE 1



MPSxxxx = Device Code  
xxxx = 918 or 3563  
A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device       | Package            | Shipping†        |
|--------------|--------------------|------------------|
| MPS918       | TO-92              | 5000 Units/Box   |
| MPS918G      | TO-92<br>(Pb-Free) | 5000 Units/Box   |
| MPS3563      | TO-92              | 5000 Units/Box   |
| MPS3563G     | TO-92<br>(Pb-Free) | 5000 Units/Box   |
| MPS3563RLRA  | TO-92              | 2000/Tape & Reel |
| MPS3563RLRAG | TO-92<br>(Pb-Free) | 2000/Tape & Reel |

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

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

Preferred devices are recommended choices for future use and best overall value.

# MPS918, MPS3563

## 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 2)<br>(I <sub>C</sub> = 3.0 mA <sub>dc</sub> , I <sub>B</sub> = 0)                                                     | MPS918<br>MPS3563 | V <sub>(BR)CEO</sub> | 15<br>12   | –<br>–   | V <sub>dc</sub>  |
| Collector – Base Breakdown Voltage<br>(I <sub>C</sub> = 1.0 μA <sub>dc</sub> , I <sub>E</sub> = 0)<br>(I <sub>C</sub> = 100 μA <sub>dc</sub> , I <sub>E</sub> = 0) | MPS918<br>MPS3563 | V <sub>(BR)CBO</sub> | 30<br>30   | –<br>–   | V <sub>dc</sub>  |
| Emitter – Base Breakdown Voltage<br>(I <sub>E</sub> = 10 μA <sub>dc</sub> , I <sub>C</sub> = 0)                                                                    | MPS918<br>MPS3563 | V <sub>(BR)EBO</sub> | 3.0<br>2.0 | –<br>–   | V <sub>dc</sub>  |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 15 V <sub>dc</sub> , I <sub>E</sub> = 0)                                                                            | MPS918<br>MPS3563 | I <sub>CBO</sub>     | –<br>–     | 10<br>50 | nA <sub>dc</sub> |

## ON CHARACTERISTICS

|                                                                                                                                                                                                 |                   |                      |          |          |                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|----------------------|----------|----------|-----------------|
| DC Current Gain (Note 2)<br>(I <sub>C</sub> = 3.0 mA <sub>dc</sub> , V <sub>CE</sub> = 1.0 V <sub>dc</sub> )<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> ) | MPS918<br>MPS3563 | h <sub>FE</sub>      | 20<br>20 | –<br>200 | –               |
| Collector – Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 1.0 mA <sub>dc</sub> )                                                                       | MPS918            | V <sub>CE(sat)</sub> | –        | 0.4      | V <sub>dc</sub> |
| Base – Emitter Saturation Voltage<br>(I <sub>C</sub> = 10 mA <sub>dc</sub> , I <sub>B</sub> = 1.0 mA <sub>dc</sub> )                                                                            | MPS918            | V <sub>BE(sat)</sub> | –        | 1.0      | V <sub>dc</sub> |

## SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                                                                                                                                                       |                             |                  |             |                   |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------------------|-------------|-------------------|-----|
| Current – Gain – Bandwidth Product (Note 2)<br>(I <sub>C</sub> = 4.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 100 MHz)<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 100 MHz)           | MPS918<br>MPS3563           | f <sub>T</sub>   | 600<br>600  | –<br>1500         | MHz |
| Output Capacitance<br>(V <sub>CB</sub> = 0 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)<br>(V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)<br>(V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz) | MPS918<br>MPS918<br>MPS3563 | C <sub>obo</sub> | –<br>–<br>– | 3.0<br>1.7<br>1.7 | pF  |
| Input Capacitance<br>(V <sub>EB</sub> = 0.5 V <sub>dc</sub> , I <sub>C</sub> = 0, f = 1.0 MHz)                                                                                                                                                        | MPS918                      | C <sub>ibo</sub> | –           | 2.0               | pF  |
| Small-Signal Current Gain<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 1.0 kHz)                                                                                                                             | MPS3563                     | h <sub>fe</sub>  | 20          | 250               | –   |
| Noise Figure<br>(I <sub>C</sub> = 1.0 mA <sub>dc</sub> , V <sub>CE</sub> = 6.0 V <sub>dc</sub> , R <sub>S</sub> = 400 kΩ, f = 60 MHz)                                                                                                                 | MPS918                      | NF               | –           | 6.0               | dB  |

## FUNCTIONAL TEST

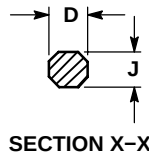
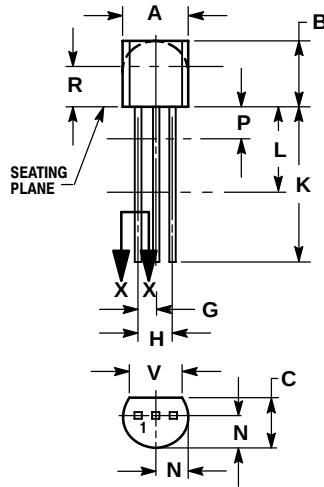
|                                                                                                                                                                                                                                                                                       |                   |                  |          |        |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|----------|--------|----|
| Common – Emitter Amplifier Power Gain<br>(I <sub>C</sub> = 6.0 mA <sub>dc</sub> , V <sub>CB</sub> = 12 V <sub>dc</sub> , f = 200 MHz)<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f = 200 MHz)<br>(G <sub>fd</sub> + G <sub>re</sub> < –20 dB) | MPS918<br>MPS3563 | G <sub>pe</sub>  | 15<br>14 | –<br>– | dB |
| Power Output<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CB</sub> = 15 V <sub>dc</sub> , f = 500 MHz)                                                                                                                                                                          | MPS918            | P <sub>out</sub> | 30       | –      | mW |
| Oscillator Collector Efficiency<br>(I <sub>C</sub> = 8.0 mA <sub>dc</sub> , V <sub>CB</sub> = 15 V <sub>dc</sub> , P <sub>out</sub> = 30 mW, f = 500 MHz)                                                                                                                             | MPS918            | η                | 25       | –      | %  |

2. Pulse Test: Pulse Width ≤ 300 μs; Duty Cycle ≤ 1.0%.

# MPS918, MPS3563

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-11  
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. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.45        | 5.20  |
| B   | 0.170  | 0.210 | 4.32        | 5.33  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.016  | 0.021 | 0.407       | 0.533 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.015  | 0.020 | 0.39        | 0.50  |
| 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   | 0.115  | ---   | 2.93        | ---   |
| V   | 0.135  | ---   | 3.43        | ---   |

### STYLE 1:

1. PIN 1. EMITTER
2. BASE
3. COLLECTOR

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