

# BS107, BS107A

Preferred Device

## Small Signal MOSFET 250 mAmps, 200 Volts N-Channel TO-92

### Features

- Pb-Free Package is Available\*

### MAXIMUM RATINGS

| Rating   | Symbol         | Value      | Unit       |
|--|----------------|------------|------------|
| Drain-Source Voltage   | $V_{DS}$       | 200        | Vdc        |
| Gate-Source Voltage  | $V_{GS}$       | $\pm 20$   | Vdc        |
| - Continuous   | $V_{GSM}$      | $\pm 30$   | Vpk        |
| - Non-repetitive ( $t_p \leq 50 \mu s$ )                                   |                |            |            |
| Drain Current  |                |            | mAdc       |
| Continuous (Note 1)  | $I_D$          | 250        |            |
| Pulsed (Note 2)  | $I_{DM}$       | 500        |            |
| Total Device Dissipation @ $T_A = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$          | 350        | mW         |
| Operating and Storage Junction<br>Temperature Range                        | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$ |

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.

- The Power Dissipation of the package may result in a lower continuous drain current.
- Pulse Test: Pulse Width  $\leq 300 \mu s$ , Duty Cycle  $\leq 2.0\%$ .



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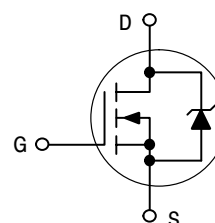
<http://onsemi.com>

250 mA, 200 V

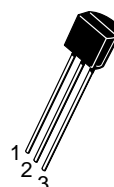
$R_{DS(on)} = 14 \Omega$  (BS107)

$R_{DS(on)} = 6.4 \Omega$  (BS107A)

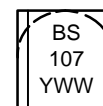
N-Channel



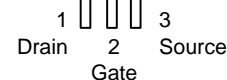
### MARKING DIAGRAM & PIN ASSIGNMENT



TO-92  
CASE 29  
STYLE 30



BS107 = Specific Device Code  
Y = Year  
WW = Work Week



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

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

# BS107, BS107A

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|  |               |     |      |    |      |
|--|---------------|-----|------|----|------|
| Zero-Gate-Voltage Drain Current ( $V_{DS} = 130\text{ Vdc}$ , $V_{GS} = 0$ ) | $I_{DSS}$     | -   | -    | 30 | nAdc |
| Drain-Source Breakdown Voltage ( $V_{GS} = 0$ , $I_D = 100\ \mu\text{Adc}$ ) | $V_{(BR)DSX}$ | 200 | -    | -  | Vdc  |
| Gate Reverse Current ( $V_{GS} = 15\text{ Vdc}$ , $V_{DS} = 0$ )             | $I_{GSS}$     | -   | 0.01 | 10 | nAdc |

### ON CHARACTERISTICS (Note 3)

|  |              |     |     |     |          |
|--|--------------|-----|-----|-----|----------|
| Gate Threshold Voltage ( $I_D = 1.0\text{ mAdc}$ , $V_{DS} = V_{GS}$ ) | $V_{GS(Th)}$ | 1.0 | -   | 3.0 | Vdc      |
| Static Drain-Source On Resistance                                      | $r_{DS(on)}$ | -   | -   | -   | $\Omega$ |
| BS107 ( $V_{GS} = 2.6\text{ Vdc}$ , $I_D = 20\text{ mAdc}$ )           |              | -   | -   | 28  |          |
| ( $V_{GS} = 10\text{ Vdc}$ , $I_D = 200\text{ mAdc}$ )                 |              | -   | -   | 14  |          |
| BS107A ( $V_{GS} = 10\text{ Vdc}$ )                                    |              | -   | 4.5 | 6.0 |          |
| ( $I_D = 100\text{ mAdc}$ )  |              | -   | 4.8 | 6.4 |          |
| ( $I_D = 250\text{ mAdc}$ )  |              | -   | -   | -   |          |

### SMALL-SIGNAL CHARACTERISTICS

|  |           |     |     |   |       |
|--|-----------|-----|-----|---|-------|
| Input Capacitance<br>( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )            | $C_{iss}$ | -   | 60  | - | pF    |
| Reverse Transfer Capacitance<br>( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ ) | $C_{rss}$ | -   | 6.0 | - | pF    |
| Output Capacitance<br>( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0$ , $f = 1.0\text{ MHz}$ )           | $C_{oss}$ | -   | 30  | - | pF    |
| Forward Transconductance<br>( $V_{DS} = 25\text{ Vdc}$ , $I_D = 250\text{ mAdc}$ )                 | $g_{fs}$  | 200 | 400 | - | mmhos |

### SWITCHING CHARACTERISTICS

|               |           |   |     |    |    |
|---------------|-----------|---|-----|----|----|
| Turn-On Time  | $t_{on}$  | - | 6.0 | 15 | ns |
| Turn-Off Time | $t_{off}$ | - | 12  | 15 | ns |

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

## RESISTIVE SWITCHING

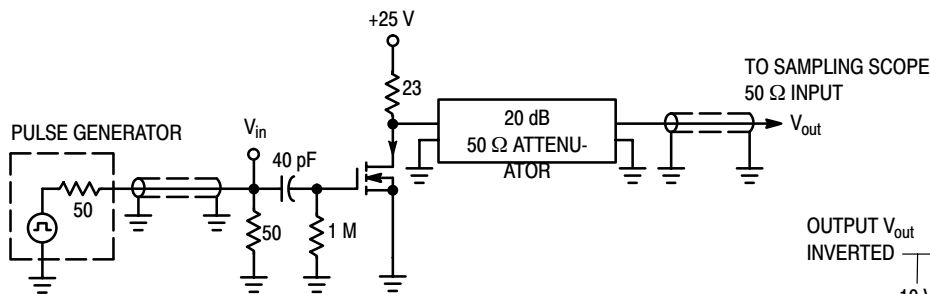


Figure 1. Switching Test Circuit

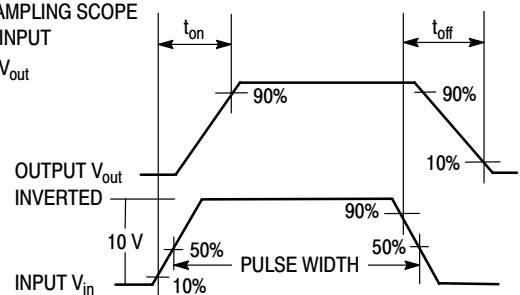


Figure 2. Switching Waveforms

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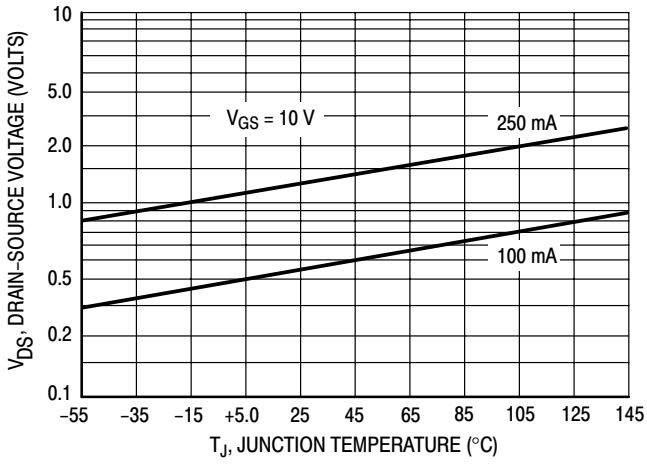


Figure 3. On Voltage versus Temperature

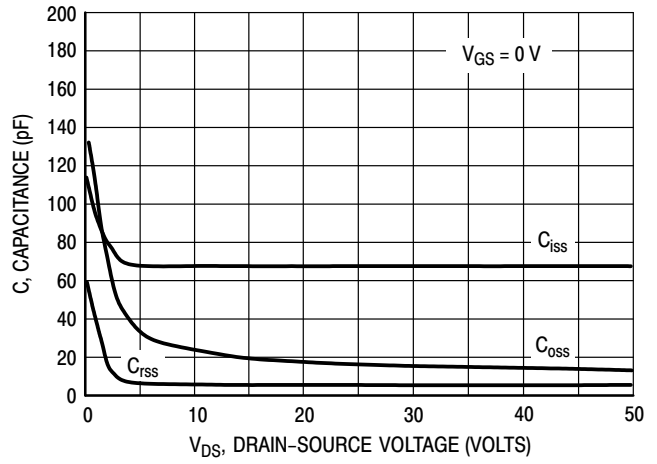


Figure 4. Capacitance Variation

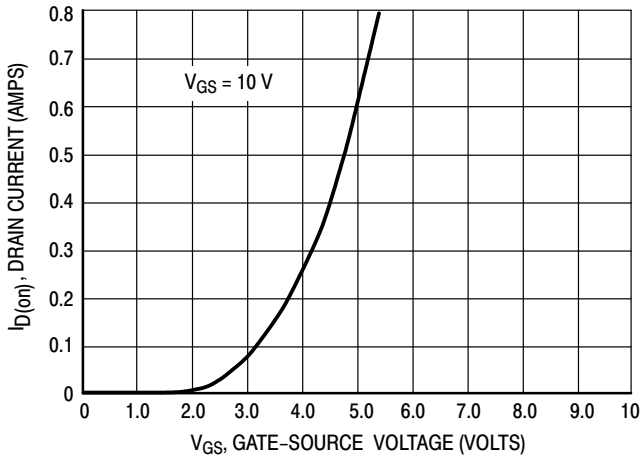


Figure 5. Transfer Characteristic

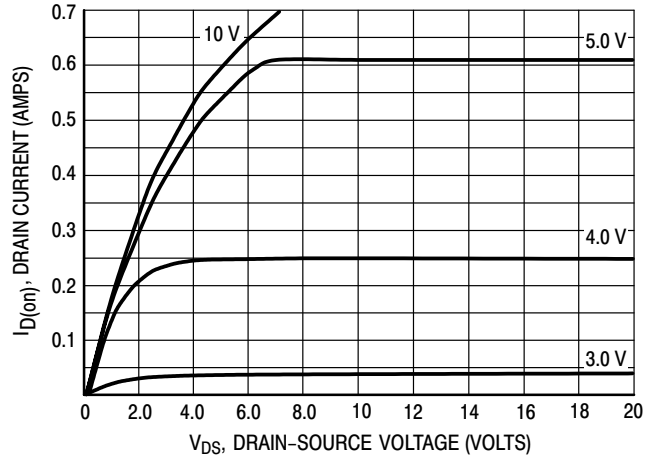


Figure 6. Output Characteristic

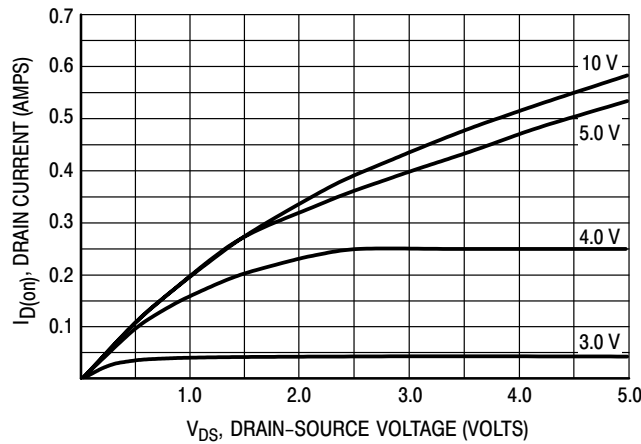


Figure 7. Saturation Characteristic

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### ORDERING INFORMATION

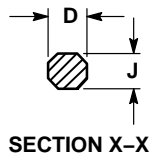
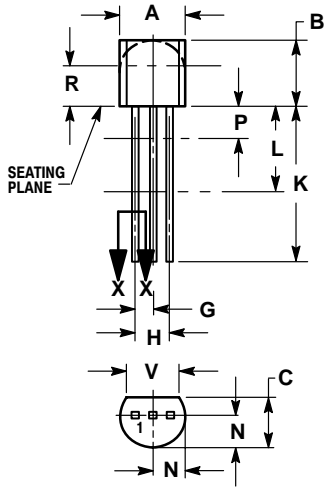
| Device     | Package            | Shipping†          |
|------------|--------------------|--------------------|
| BS107      | TO-92              | 1000 Unit / Box    |
| BS107G     | TO-92<br>(Pb-Free) |                    |
| BS107RLRA  | TO-92              | 2000 / Tape & Reel |
| BS107RL1   | TO-92              | 2000 / Tape & Reel |
| BS107A     | TO-92              | 1000 Units / Box   |
| BS107AG    | TO-92<br>(Pb-Free) |                    |
| BS107ARLRM | TO-92              | 2000 Ammo Pack     |
| BS107ARLRP | TO-92              | 2000 Ammo Pack     |
| BS107ARL1  | TO-92              | 2000 / Tape & Reel |
| BS107ARL1G | TO-92<br>(Pb-Free) |                    |

†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.

# BS107, BS107A

## 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 30:

1. DRAIN
2. GATE
3. SOURCE

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