

BS170

Small Signal MOSFET 500 mA, 60 Volts N-Channel TO-92 (TO-226)

Features

- This is a Pb-Free Device*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-------------|------------|
| Drain-Source Voltage | V_{DS} | 60 | Vdc |
| Gate-Source Voltage | V_{GS} | ± 20 | Vdc |
| - Continuous | V_{GSM} | ± 40 | Vpk |
| - Non-repetitive ($t_p \leq 50 \mu s$) | | | |
| Drain Current (Note) | I_D | 0.5 | Adc |
| Total Device Dissipation @ $T_A = 25^\circ C$ | P_D | 350 | mW |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ C$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

NOTE: The Power Dissipation of the package may result in a lower continuous drain current.

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

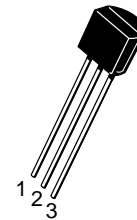
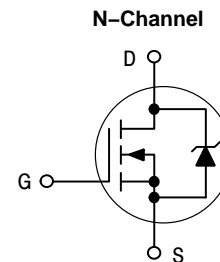


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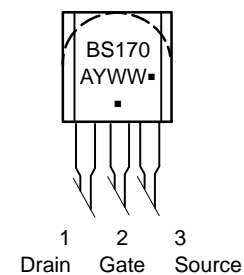
500 mA, 60 Volts

$R_{DS(on)} = 5.0 \Omega$



TO-92 (TO-226)
CASE 29
STYLE 30

MARKING DIAGRAM & PIN ASSIGNMENT



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.

BS170

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

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

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|----|------|----|------|
| Gate Reverse Current ($V_{GS} = 15\text{ Vdc}$, $V_{DS} = 0$) | I_{GSS} | – | 0.01 | 10 | nAdc |
| Drain–Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 100\ \mu\text{Adc}$) | $V_{(BR)DSS}$ | 60 | 90 | – | Vdc |

ON CHARACTERISTICS (Note 1)

| | | | | | |
|--|--------------|-----|-----|-----|---------------|
| Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 1.0\ \text{mAdc}$) | $V_{GS(Th)}$ | 0.8 | 2.0 | 3.0 | Vdc |
| Static Drain–Source On Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 200\ \text{mAdc}$) | $r_{DS(on)}$ | – | 1.8 | 5.0 | Ω |
| Drain Cutoff Current ($V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$) | $I_{D(off)}$ | – | – | 0.5 | μA |
| Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 250\ \text{mAdc}$) | g_{fs} | – | 200 | – | mmhos |

SMALL–SIGNAL CHARACTERISTICS

| | | | | | |
|---|-----------|---|---|----|----|
| Input Capacitance ($V_{DS} = 10\text{ Vdc}$, $V_{GS} = 0$, $f = 1.0\text{ MHz}$) | C_{iss} | – | – | 60 | pF |
|---|-----------|---|---|----|----|

SWITCHING CHARACTERISTICS

| | | | | | |
|---|-----------|---|-----|----|----|
| Turn–On Time ($I_D = 0.2\ \text{Adc}$) See Figure 1 | t_{on} | – | 4.0 | 10 | ns |
| Turn–Off Time ($I_D = 0.2\ \text{Adc}$) See Figure 1 | t_{off} | – | 4.0 | 10 | ns |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|------------|-----------------------------|-----------------------|
| BS170 | TO–92 (TO–226) (Pb–Free) | 1000 Unit/Tube |
| BS170RLRAG | TO–92 (TO–226) (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 Specifications Brochure, BRD8011/D.

RESISTIVE SWITCHING

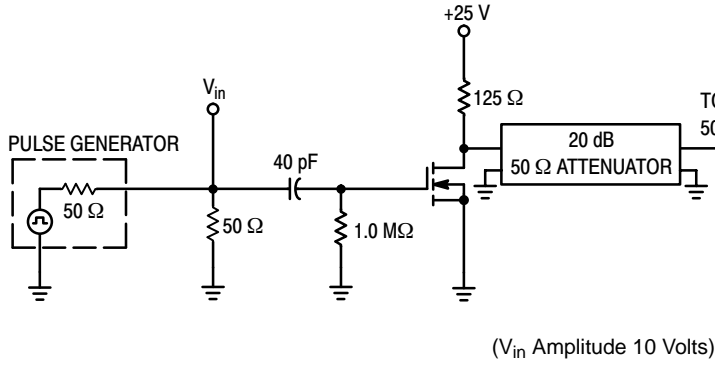


Figure 1. Switching Test Circuit

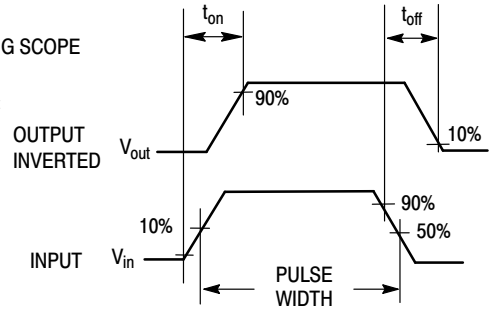


Figure 2. Switching Waveforms

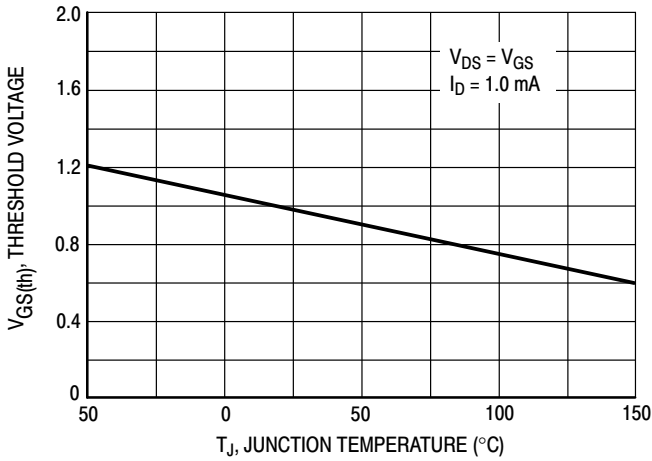


Figure 3. $V_{GS(th)}$ Normalized versus Temperature

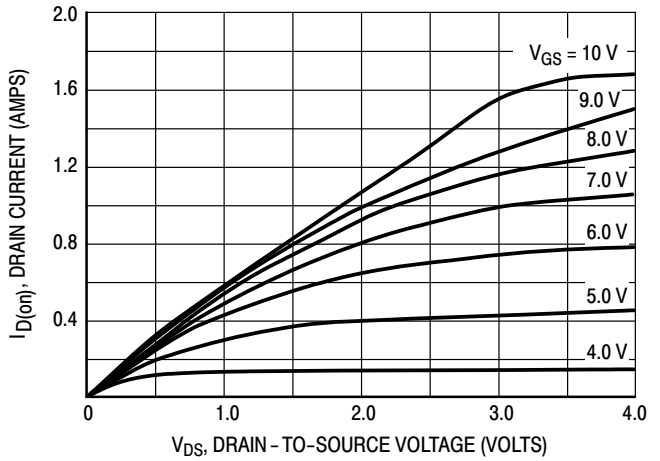


Figure 4. On-Region Characteristics

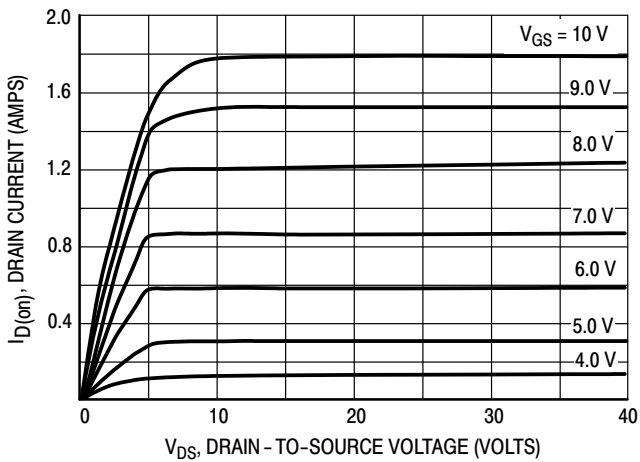


Figure 5. Output Characteristics

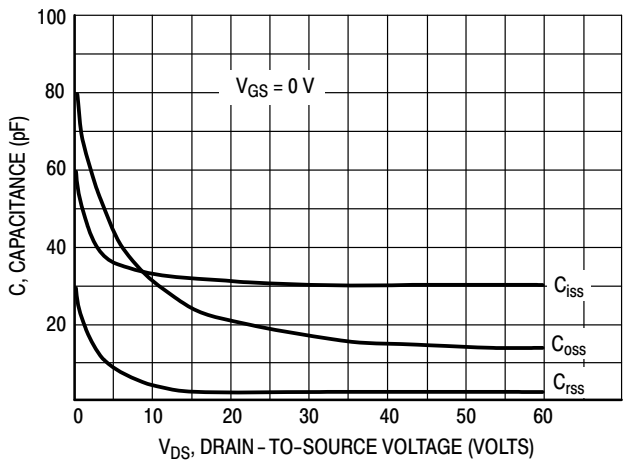
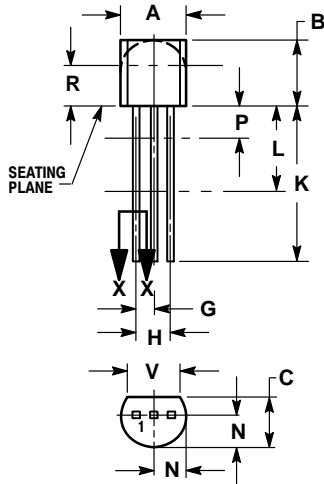


Figure 6. Capacitance versus Drain-To-Source Voltage

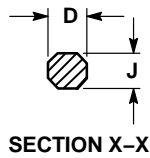
BS170

PACKAGE DIMENSIONS

TO-92 (TO-226) CASE 29-11 ISSUE AM



STRAIGHT LEAD
BULK PACK

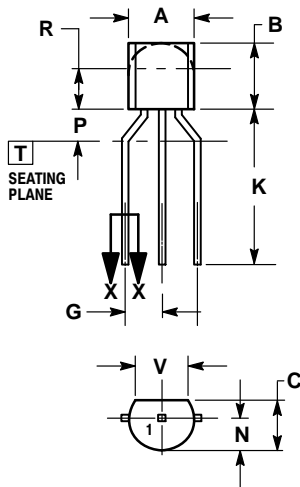


SECTION X-X

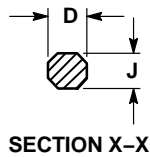
NOTES:

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 | --- |



BENT LEAD
TAPE & REEL
AMMO PACK



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | MILLIMETERS | |
|-----|-------------|------|
| | MIN | MAX |
| A | 4.45 | 5.20 |
| B | 4.32 | 5.33 |
| C | 3.18 | 4.19 |
| D | 0.40 | 0.54 |
| G | 2.40 | 2.80 |
| J | 0.39 | 0.50 |
| K | 12.70 | --- |
| N | 2.04 | 2.66 |
| P | 1.50 | 4.00 |
| R | 2.93 | --- |
| V | 3.43 | --- |

STYLE 30:

1. DRAIN
2. GATE
3. SOURCE

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