

BS170

Preferred Device

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

Features

- Pb-Free Package is Available*

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 | $^\circ C$ |

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



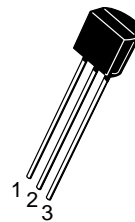
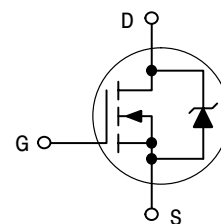
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500 mA, 60 V

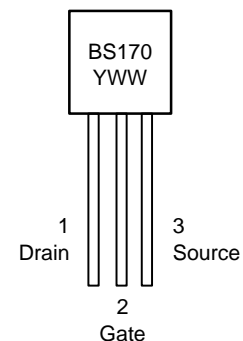
$R_{DS(on)} = 5 \Omega$

N-Channel



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

MARKING DIAGRAM & PIN ASSIGNMENT



Y = Year
WW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

*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.

BS170

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

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

OFF CHARACTERISTICS

| | | | | | |
|--|----------------------|----|------|----|------|
| Gate Reverse Current (V _{GS} = 15 Vdc, V _{DS} = 0) | I _{GSS} | - | 0.01 | 10 | nAdc |
| Drain-Source Breakdown Voltage (V _{GS} = 0, I _D = 100 μAdc) | V _{(BR)DSS} | 60 | 90 | - | Vdc |

ON CHARACTERISTICS (Note 1)

| | | | | | |
|--|---------------------|-----|-----|-----|-------|
| Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 1.0 mAdc) | V _{GS(Th)} | 0.8 | 2.0 | 3.0 | Vdc |
| Static Drain-Source On Resistance (V _{GS} = 10 Vdc, I _D = 200 mAdc) | r _{DS(on)} | - | 1.8 | 5.0 | Ω |
| Drain Cutoff Current (V _{DS} = 25 Vdc, V _{GS} = 0 Vdc) | I _{D(off)} | - | - | 0.5 | μA |
| Forward Transconductance (V _{DS} = 10 Vdc, I _D = 250 mAdc) | g _{fs} | - | 200 | - | mmhos |

SMALL-SIGNAL CHARACTERISTICS

| | | | | | |
|---|------------------|---|---|----|----|
| Input Capacitance (V _{DS} = 10 Vdc, V _{GS} = 0, f = 1.0 MHz) | C _{iss} | - | - | 60 | pF |
|---|------------------|---|---|----|----|

SWITCHING CHARACTERISTICS

| | | | | | |
|--|------------------|---|-----|----|----|
| Turn-On Time (I _D = 0.2 Adc) See Figure 1 | t _{on} | - | 4.0 | 10 | ns |
| Turn-Off Time (I _D = 0.2 Adc) See Figure 1 | t _{off} | - | 4.0 | 10 | ns |

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

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-----------|-----------------------------|-----------------------|
| BS170 | TO-92 (TO-226) | 1000 Unit / Box |
| BS170G | TO-92 (TO-226) (Pb-Free) | 1000 Unit / Box |
| BS170RLRA | TO-92 (TO-226) | 2000 Tape & Reel |
| BS170RLRM | | 2000 Tape & Ammo Box |
| BS170RLRP | | 2000 Tape & Ammo Box |
| BS170RL1 | | 2000 Tape & Reel |
| BS170ZL1 | | 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.

RESISTIVE SWITCHING

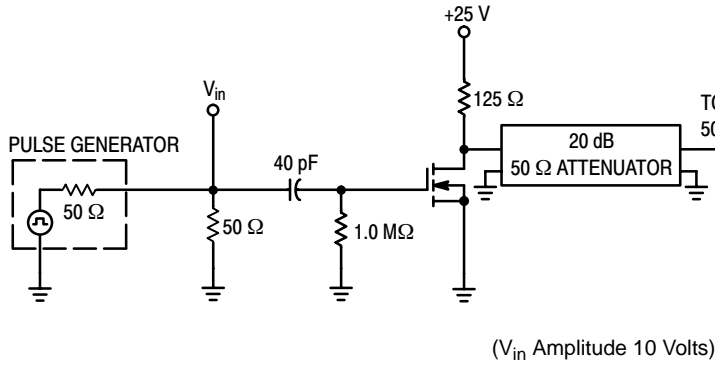


Figure 1. Switching Test Circuit

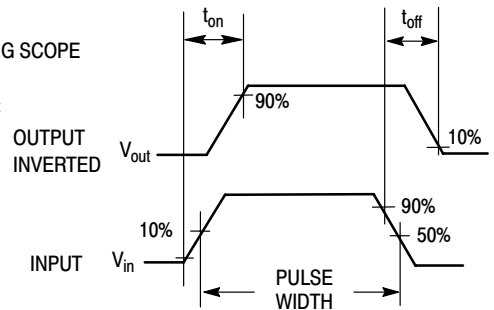


Figure 2. Switching Waveforms

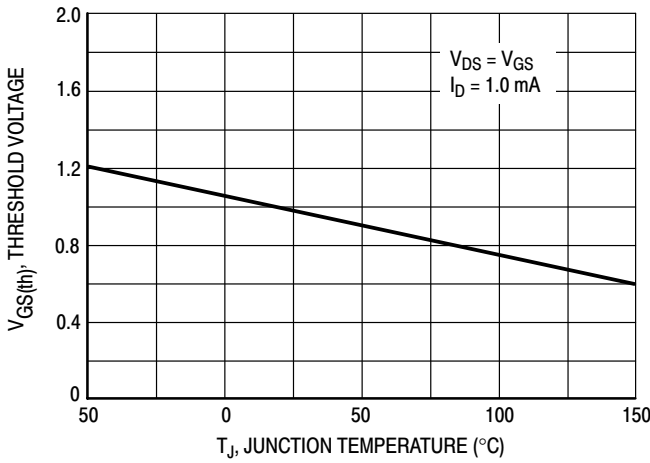


Figure 3. $V_{GS(th)}$ Normalized versus Temperature

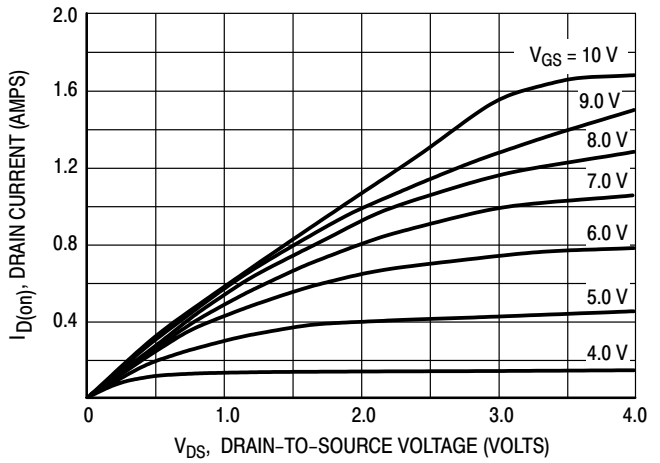


Figure 4. On-Region Characteristics

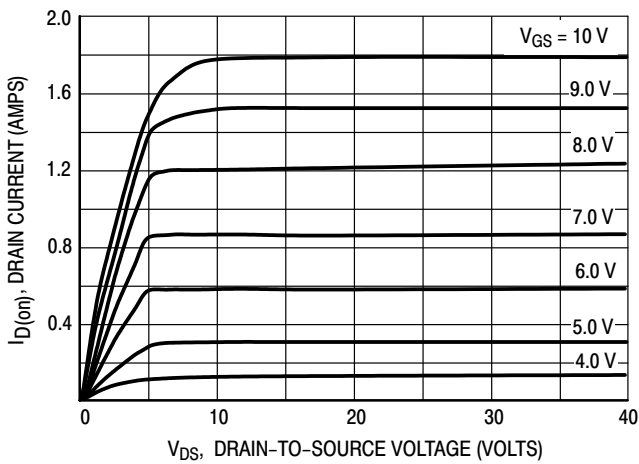


Figure 5. Output Characteristics

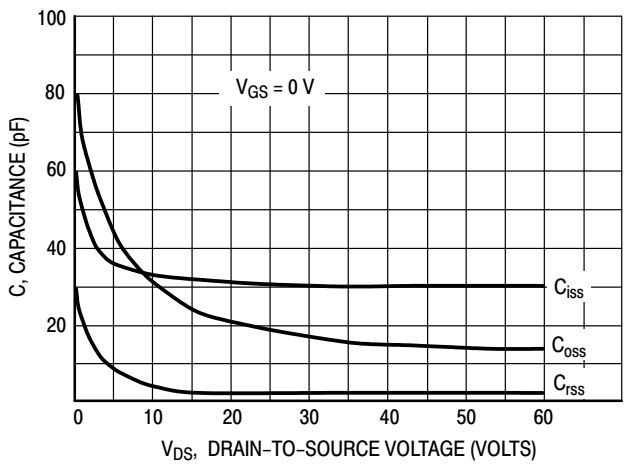
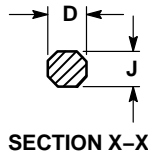
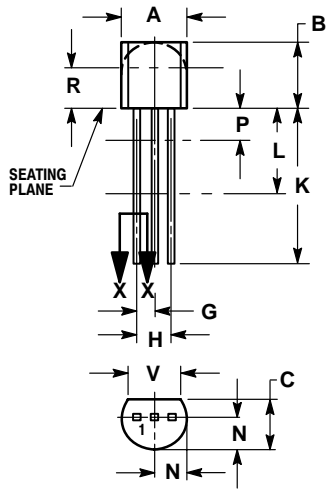


Figure 6. Capacitance versus Drain-To-Source Voltage

BS170

PACKAGE DIMENSIONS

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