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# 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	$V_{GS}$	$\pm 20$	Vdc
	$V_{GSM}$	$\pm 40$	Vpk
Drain Current (Note)	$I_D$	0.5	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$	$P_D$	350	mW
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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.

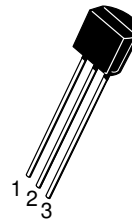
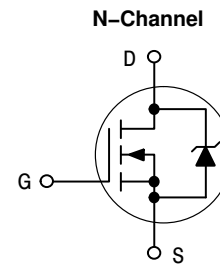


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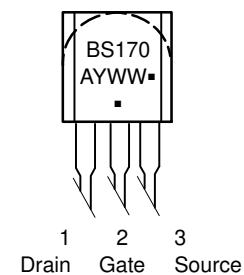
500 mA, 60 Volts

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



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
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### 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	$\Omega$
Drain Cutoff Current ( $V_{DS} = 25\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ )	$I_{D(off)}$	–	–	0.5	$\mu\text{A}$
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
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### 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 <sup>†</sup>
BS170	TO–92 (TO–226) (Pb–Free)	1000 Unit/Tube
BS170RLRAG	TO–92 (TO–226) (Pb–Free)	2000 Tape & Reel

<sup>†</sup>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

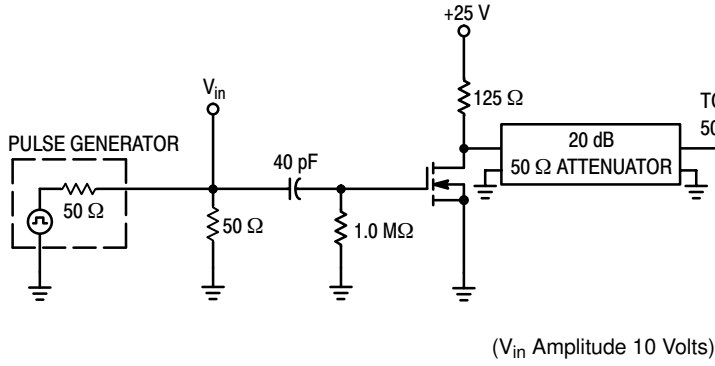


Figure 1. Switching Test Circuit

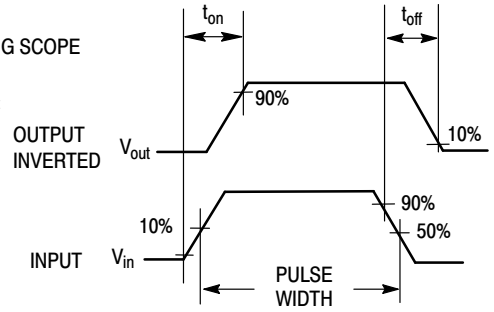


Figure 2. Switching Waveforms

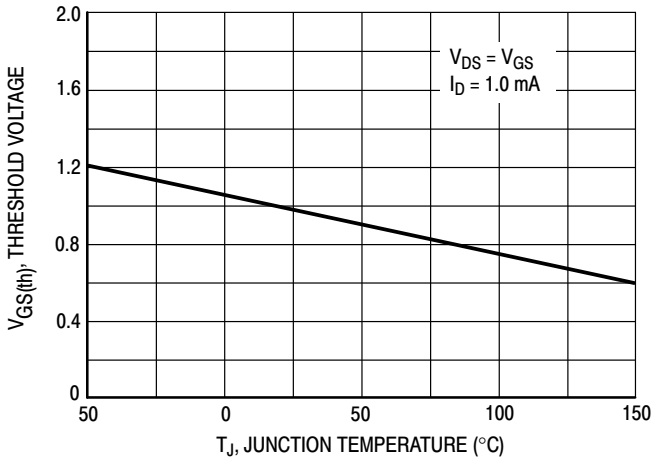


Figure 3.  $V_{GS(th)}$  Normalized versus Temperature

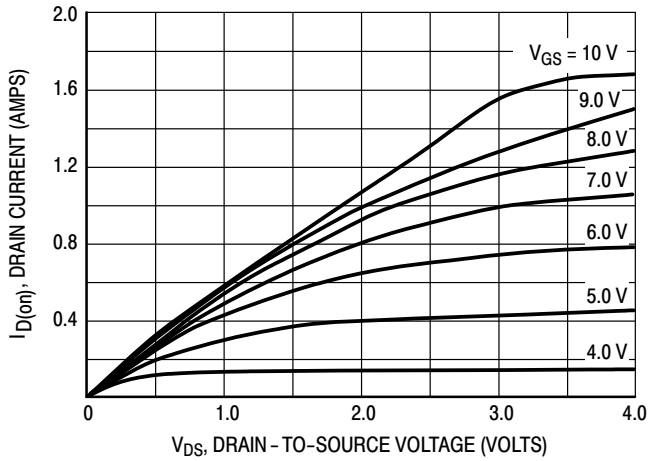


Figure 4. On-Region Characteristics

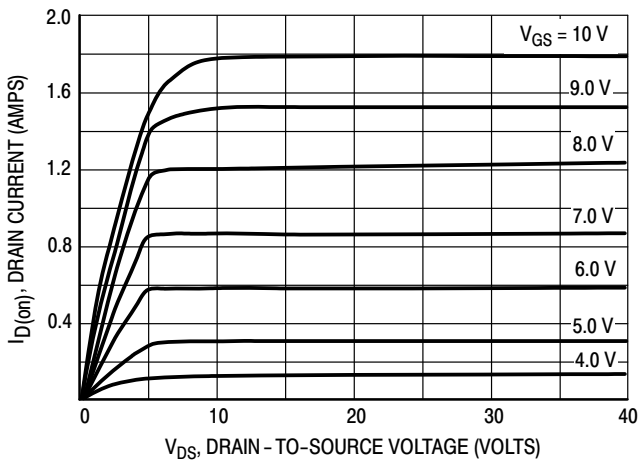


Figure 5. Output Characteristics

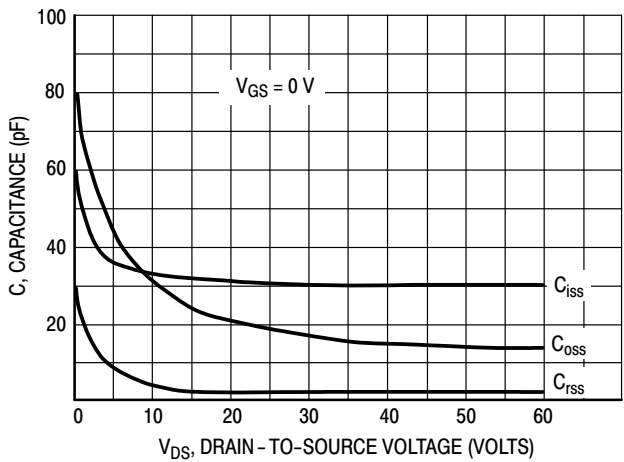


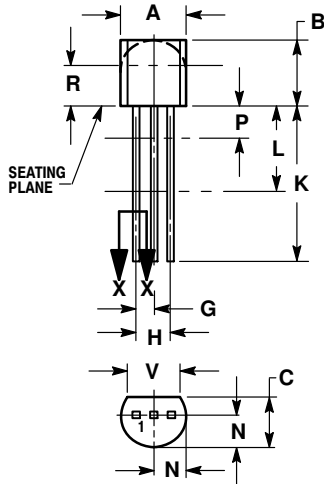
Figure 6. Capacitance versus Drain-To-Source Voltage



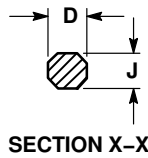
# BS170

## PACKAGE DIMENSIONS

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



STRAIGHT LEAD  
BULK PACK

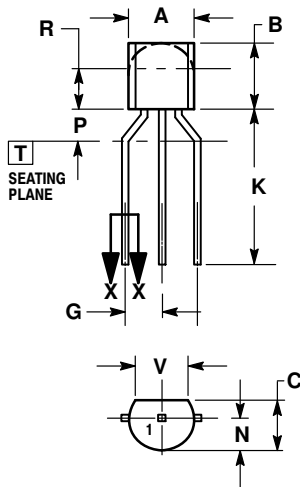


SECTION X-X

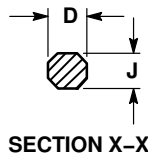
NOTES:

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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