

# BS170

Preferred Device

## Small Signal MOSFET 500 mA, 60 Volts 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	$V_{GS}$	$\pm 20$	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	$^\circ\text{C}$

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.

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



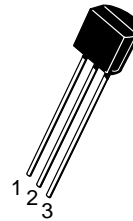
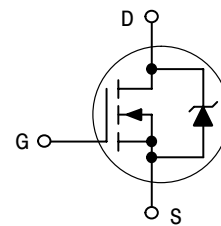
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<http://onsemi.com>

**500 mA, 60 Volts**

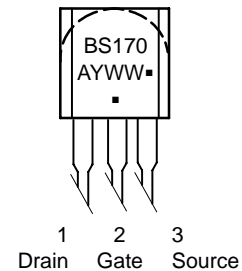
$R_{DS(on)} = 5.0 \Omega$

N-Channel



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

### MARKING DIAGRAM & PIN ASSIGNMENT



BS170 = Device Code  
 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.

**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.

# BS170

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Gate Reverse Current (V <sub>GS</sub> = 15 Vdc, V <sub>DS</sub> = 0)	I <sub>GSS</sub>	–	0.01	10	nAdc
Drain–Source Breakdown Voltage (V <sub>GS</sub> = 0, I <sub>D</sub> = 100 μAdc)	V <sub>(BR)DSS</sub>	60	90	–	Vdc

### ON CHARACTERISTICS (Note 1)

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

### SMALL–SIGNAL CHARACTERISTICS

Input Capacitance (V <sub>DS</sub> = 10 Vdc, V <sub>GS</sub> = 0, f = 1.0 MHz)	C <sub>iss</sub>	–	–	60	pF
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### SWITCHING CHARACTERISTICS

Turn–On Time (I <sub>D</sub> = 0.2 Adc) See Figure 1	t <sub>on</sub>	–	4.0	10	ns
Turn–Off Time (I <sub>D</sub> = 0.2 Adc) See Figure 1	t <sub>off</sub>	–	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/Tube
BS170G	TO–92 (TO–226) (Pb–Free)	1000 Unit/Tube
BS170RLRA	TO–92 (TO–226)	2000 Tape & Reel
BS170RLRAG	TO–92 (TO–226) (Pb–Free)	2000 Tape & Reel
BS170RLRM	TO–92 (TO–226)	2000 Tape & Reel
BS170RLRMG	TO–92 (TO–226) (Pb–Free)	2000 Tape & Reel
BS170RLRP	TO–92 (TO–226)	2000 Tape & Reel
BS170RLRPG	TO–92 (TO–226) (Pb–Free)	2000 Tape & Reel
BS170RL1	TO–92 (TO–226)	2000 Tape & Reel
BS170RL1G	TO–92 (TO–226) (Pb–Free)	2000 Tape & Reel
BS170ZL1	TO–92 (TO–226)	2000 Tape & Reel
BS170ZL1G	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

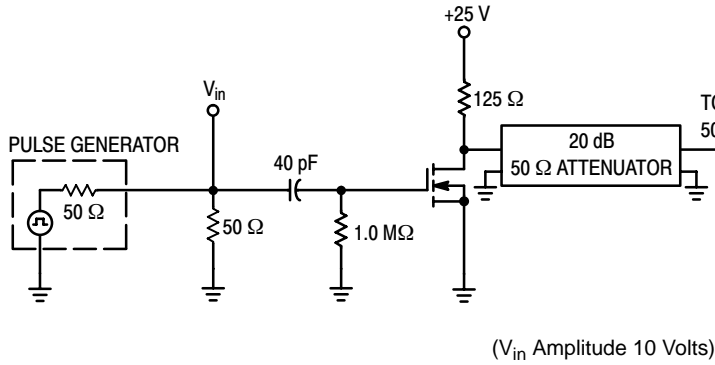


Figure 1. Switching Test Circuit

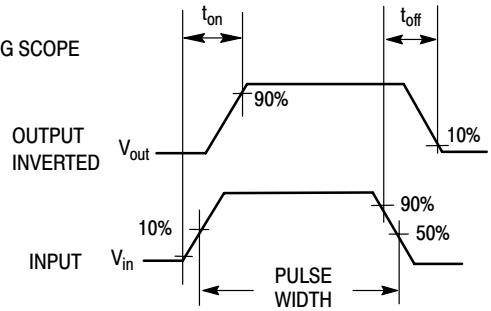


Figure 2. Switching Waveforms

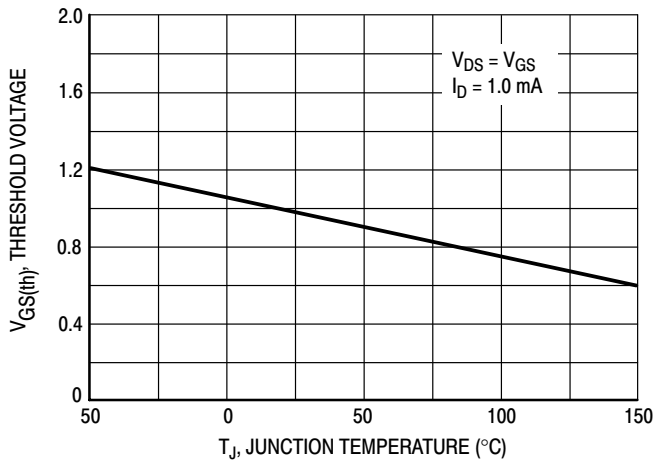


Figure 3.  $V_{GS(th)}$  Normalized versus Temperature

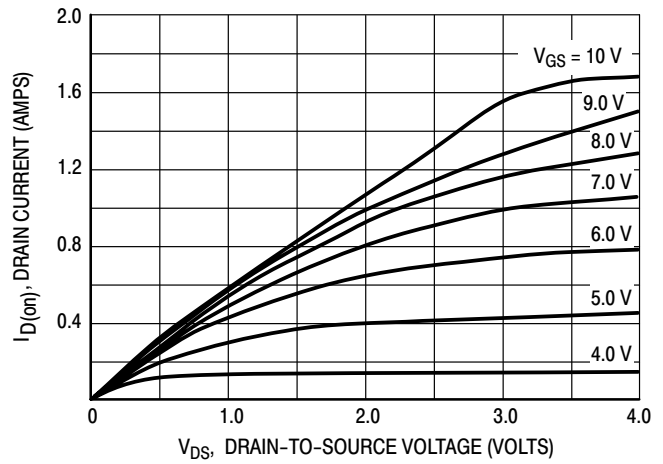


Figure 4. On-Region Characteristics

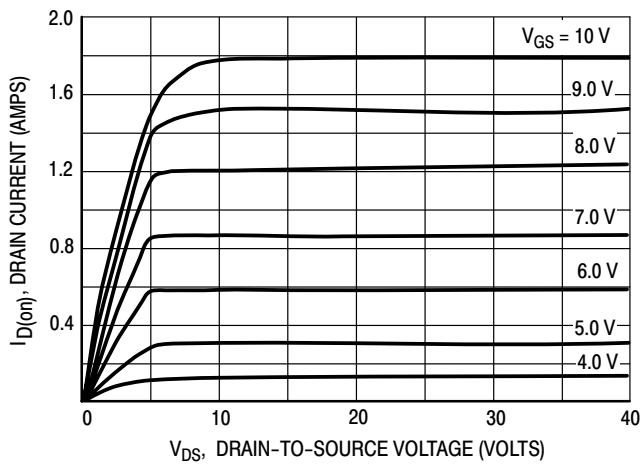


Figure 5. Output Characteristics

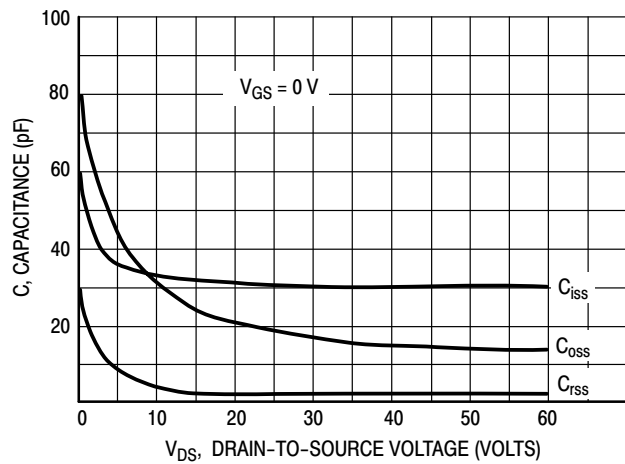
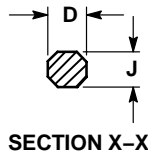
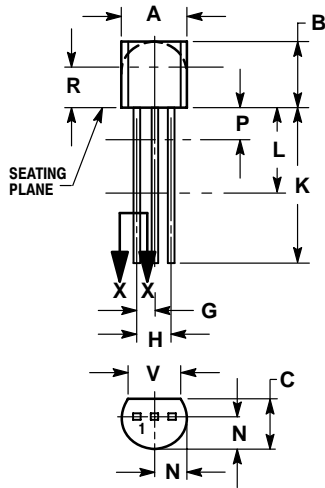


Figure 6. Capacitance versus Drain-To-Source Voltage

# BS170

## PACKAGE DIMENSIONS

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