

# 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	$V_{GS}$	$\pm 20$	Vdc
- Continuous	$V_{GSM}$	$\pm 40$	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.



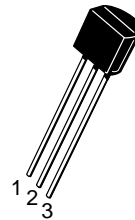
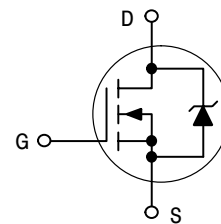
ON Semiconductor®

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500 mA, 60 V

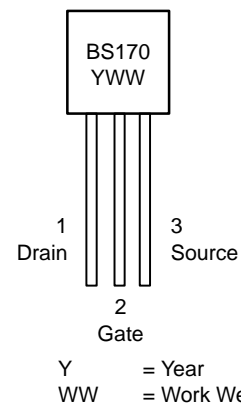
$R_{DS(on)} = 5 \Omega$

N-Channel



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

### MARKING DIAGRAM & PIN ASSIGNMENT



### 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<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 / 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

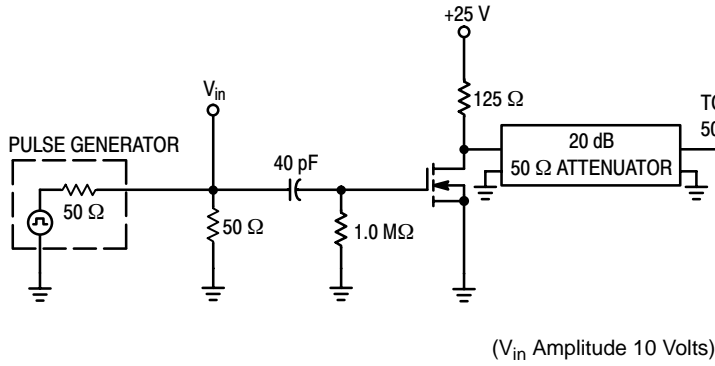


Figure 1. Switching Test Circuit

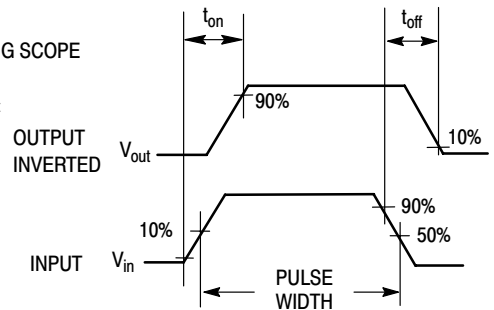


Figure 2. Switching Waveforms

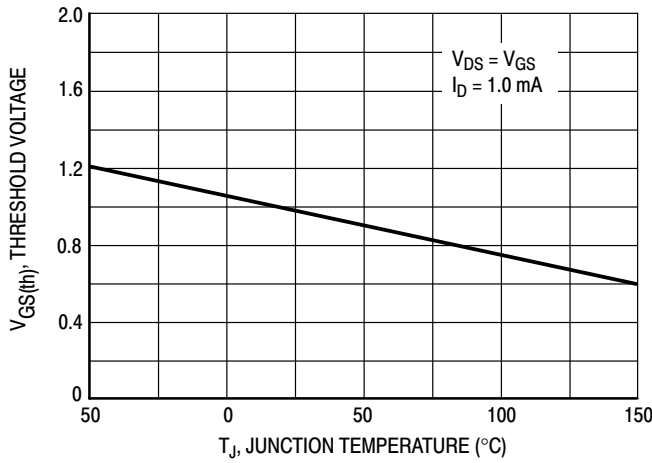


Figure 3.  $V_{GS(th)}$  Normalized versus Temperature

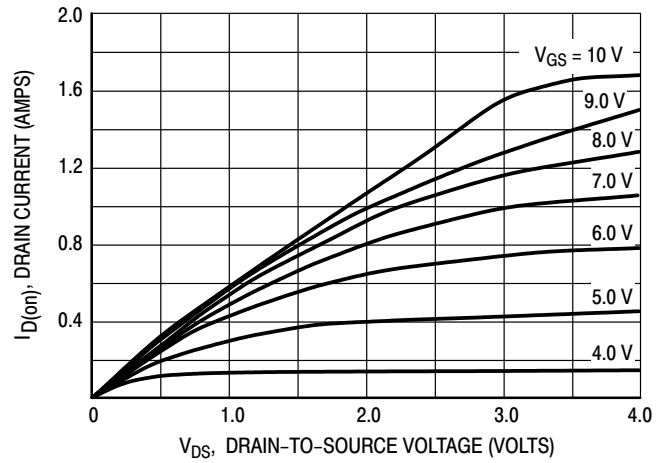


Figure 4. On-Region Characteristics

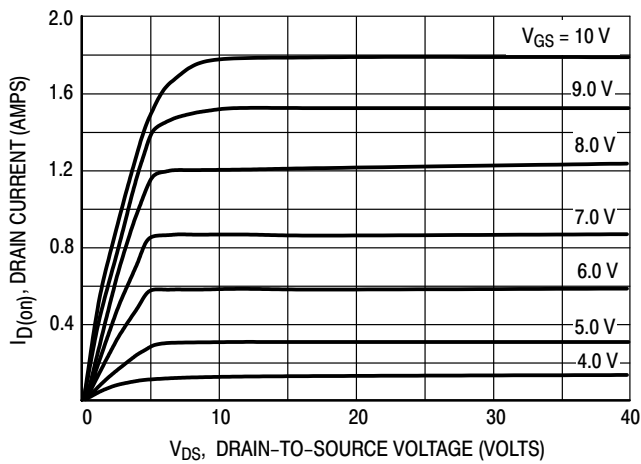


Figure 5. Output Characteristics

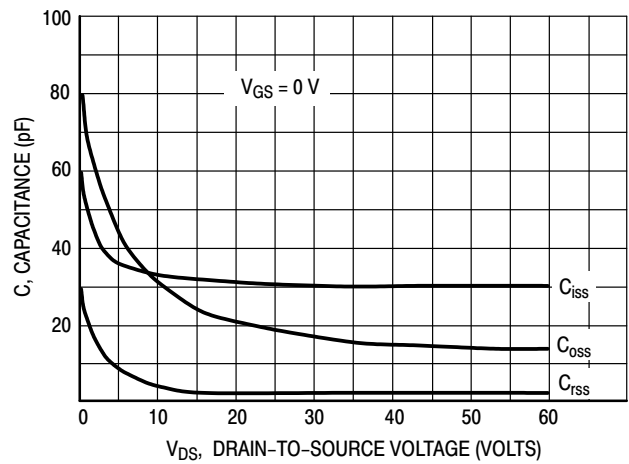
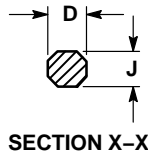
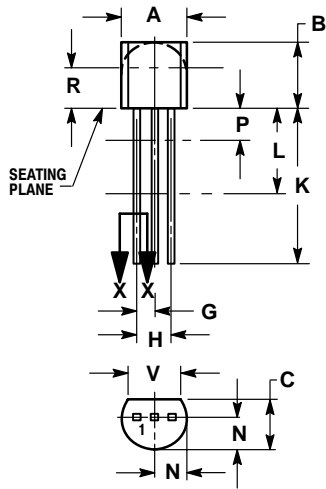


Figure 6. Capacitance versus Drain-To-Source Voltage

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## 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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