BS170

Small Signal MOSFET 500 mA, 60 Volts

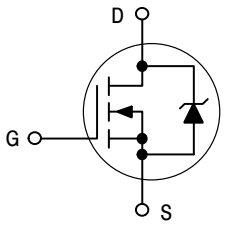
N−Channel TO−92 (TO−226)

ON Semiconductor®

www.onsemi.com

500 mA, 60 Volts
$R_{DS(on)}$ = 5.0 Ω

N−Channel



Features

- This is a Pb−Free Device*

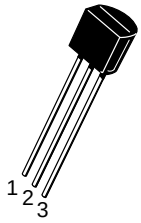
MAXIMUM RATINGS

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

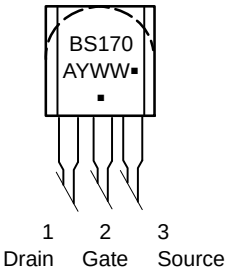
NOTE: The Power Dissipation of the package may result in a lower continuous drain current.

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



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.

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

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 ≤ 300 μs, Duty Cycle ≤ 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

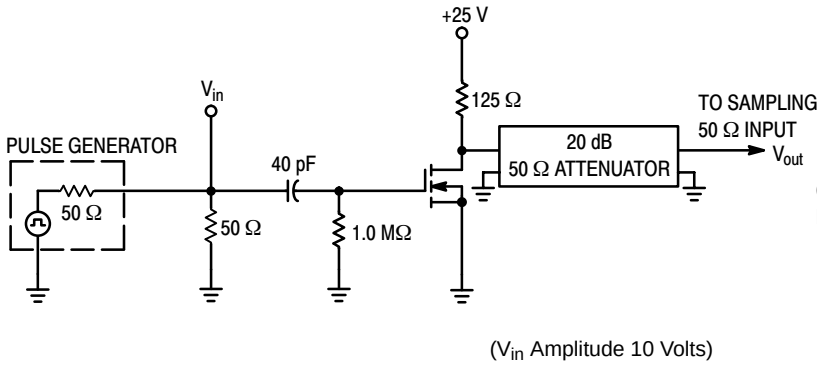


Figure 1. Switching Test Circuit

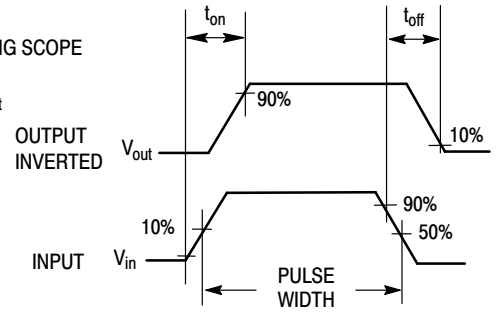


Figure 2. Switching Waveforms

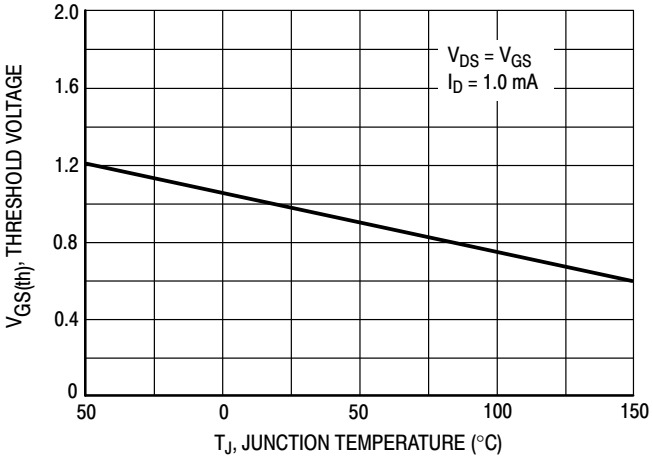


Figure 3. $V_{GS(th)}$ Normalized versus Temperature

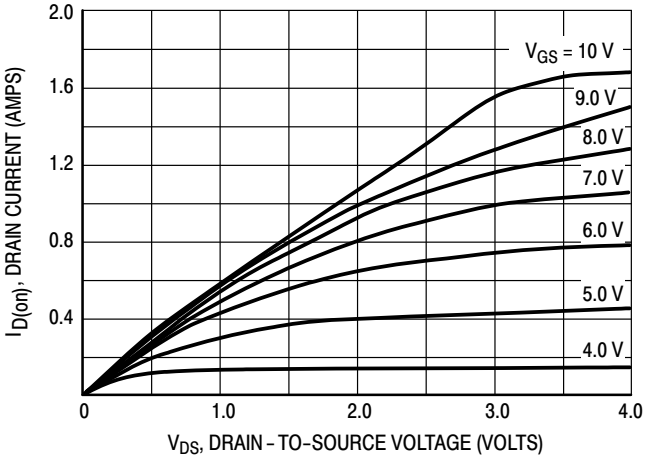


Figure 4. On−Region Characteristics

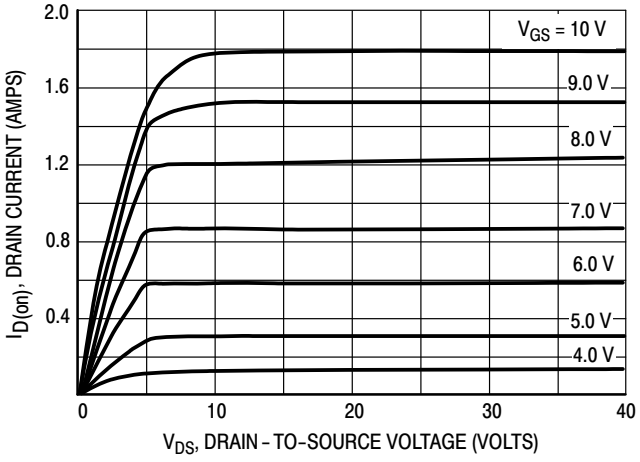


Figure 5. Output Characteristics

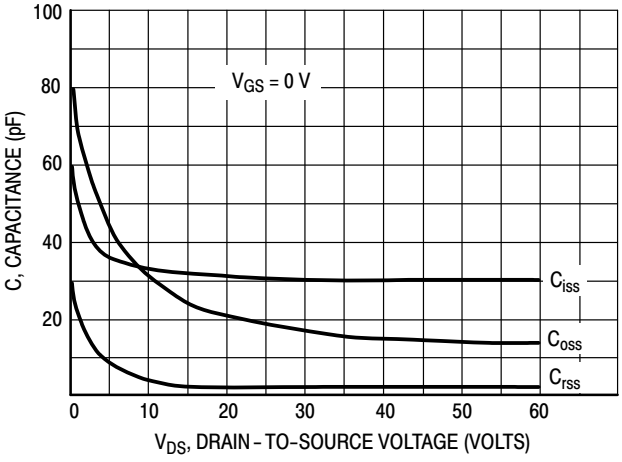


Figure 6. Capacitance versus Drain−To−Source Voltage

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
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ONLINE SUPPORT: www.onsemi.com/support
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