

Dual-gate MOS-FETs

BF908; BF908R

FEATURES

- High forward transfer admittance
- Short channel transistor with high forward transfer admittance to input capacitance ratio
- Low noise gain controlled amplifier up to 1 GHz.

APPLICATIONS

- VHF and UHF applications with 12 V supply voltage, such as television tuners and professional communications equipment.

DESCRIPTION

Depletion type field-effect transistor in a plastic microminiature SOT143 or SOT143R package. The transistors are protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING

PIN	SYMBOL	DESCRIPTION
1	s, b	source
2	d	drain
3	g ₂	gate 2
4	g ₁	gate 1

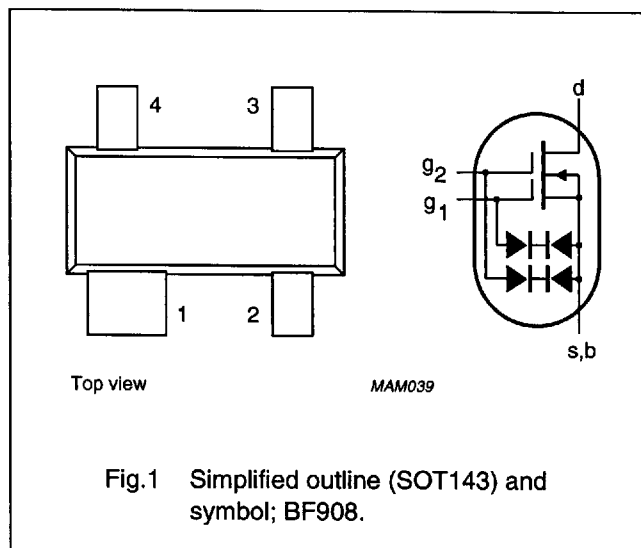


Fig.1 Simplified outline (SOT143) and symbol; BF908.

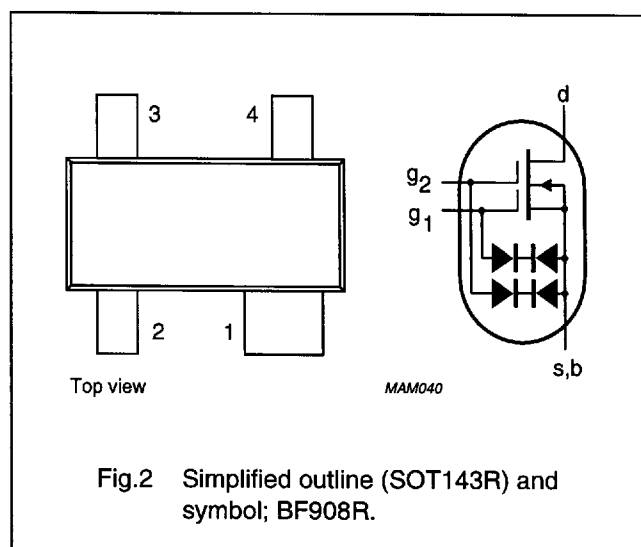


Fig.2 Simplified outline (SOT143R) and symbol; BF908R.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DS}	drain-source voltage		—	—	12	V
I_D	drain current		—	—	40	mA
P_{tot}	total power dissipation		—	—	200	mW
T_j	operating junction temperature		—	—	150	°C
$ y_{fs} $	forward transfer admittance		36	43	50	mS
C_{ig1-s}	input capacitance at gate 1		2.4	3.1	4	pF
C_{rs}	reverse transfer capacitance	$f = 1 \text{ MHz}$	20	30	45	pF
F	noise figure	$f = 800 \text{ MHz}$	—	1.5	2.5	dB

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	12	V
I_D	drain current		–	40	mA
$\pm I_{G1}$	gate 1 current		–	10	mA
$\pm I_{G2}$	gate 2 current		–	10	mA
P_{tot}	total power dissipation	see Fig.3; note 1			
	BF908	up to $T_{amb} = 50\text{ }^{\circ}\text{C}$	–	200	mW
	BF908R	up to $T_{amb} = 40\text{ }^{\circ}\text{C}$	–	200	mW
T_{stg}	storage temperature		–65	+150	$^{\circ}\text{C}$
T_j	operating junction temperature		–	150	$^{\circ}\text{C}$

Note

1. Device mounted on a printed-circuit board.

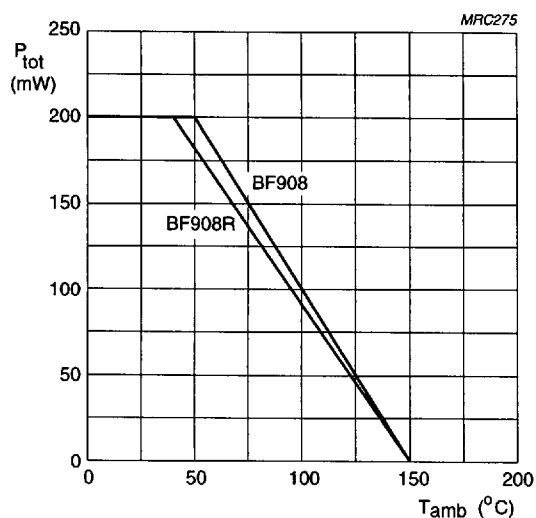


Fig.3 Power derating curves.

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THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1		
	BF908		500	K/W
	BF908R		550	K/W

Note

1. Device mounted on a printed-circuit board.

STATIC CHARACTERISTICS

$T_j = 25\text{ }^{\circ}\text{C}$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$\pm V_{(BR)G1-SS}$	gate 1-source breakdown voltage	$V_{G2-S} = V_{DS} = 0$; $I_{G1-S} = 10\text{ mA}$	8	–	20	V
$\pm V_{(BR)G2-SS}$	gate 2-source breakdown voltage	$V_{G1-S} = V_{DS} = 0$; $I_{G2-S} = 10\text{ mA}$	8	–	20	V
$-V_{(P)G1-S}$	gate 1-source cut-off voltage	$V_{G2-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $I_D = 20\text{ }\mu\text{A}$	–	–	2	V
$-V_{(P)G2-S}$	gate 2-source cut-off voltage	$V_{G1-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $I_D = 20\text{ }\mu\text{A}$	–	–	1.5	V
I_{DSS}	drain-source current	$V_{G2-S} = 4\text{ V}$; $V_{DS} = 8\text{ V}$; $V_{G1-S} = 0$	3	15	27	mA
$\pm I_{G1-SS}$	gate 1 cut-off current	$V_{G2-S} = V_{DS} = 0$; $V_{G1-S} = 5\text{ V}$	–	–	50	nA
$\pm I_{G2-SS}$	gate 2 cut-off current	$V_{G1-S} = V_{DS} = 0$; $V_{G2-S} = 5\text{ V}$	–	–	50	nA

DYNAMIC CHARACTERISTICS

Common source; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $V_{DS} = 8\text{ V}$; $V_{G2-S} = 4\text{ V}$; $I_D = 15\text{ mA}$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$ y_{fs} $	forward transfer admittance	pulsed; $T_j = 25\text{ }^{\circ}\text{C}$; $f = 1\text{ MHz}$	36	43	50	mS
C_{ig1-s}	input capacitance at gate 1	$f = 1\text{ MHz}$	2.4	3.1	4	pF
C_{ig2-s}	input capacitance at gate 2	$f = 1\text{ MHz}$	1.2	1.8	2.5	pF
C_{os}	output capacitance	$f = 1\text{ MHz}$	1.2	1.7	2.2	pF
C_{rs}	reverse transfer capacitance	$f = 1\text{ MHz}$	20	30	45	fF
F	noise figure	$f = 200\text{ MHz}$; $G_S = 2\text{ mS}$; $B_S = B_{Sopt}$	–	0.6	1.2	dB
		$f = 800\text{ MHz}$; $G_S = G_{Sopt}$; $B_S = B_{Sopt}$	–	1.5	2.5	dB

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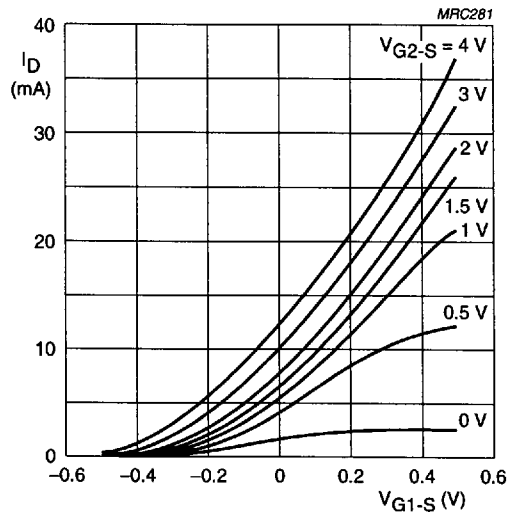
 $V_{DS} = 8 \text{ V}$; $T_j = 25^\circ\text{C}$.

Fig.4 Transfer characteristics; typical values.

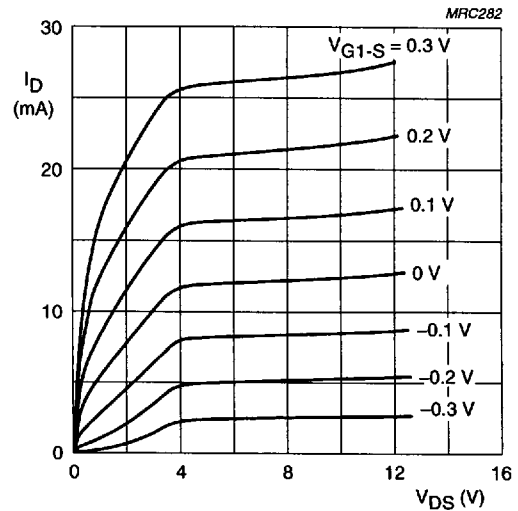
 $V_{G2-S} = 4 \text{ V}$; $T_j = 25^\circ\text{C}$.

Fig.5 Output characteristics; typical values.

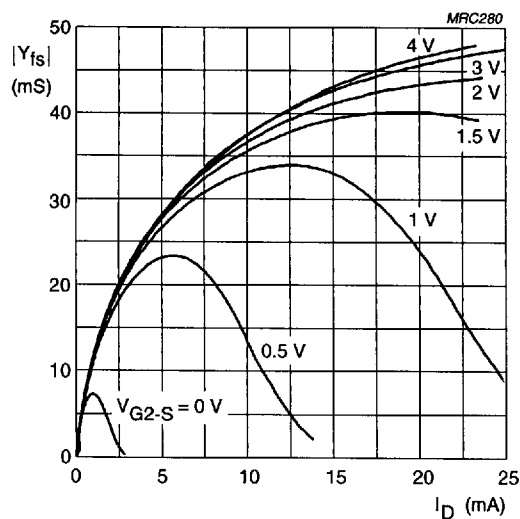
 $V_{DS} = 8 \text{ V}$; $T_j = 25^\circ\text{C}$.

Fig.6 Forward transfer admittance as a function of drain current; typical values.

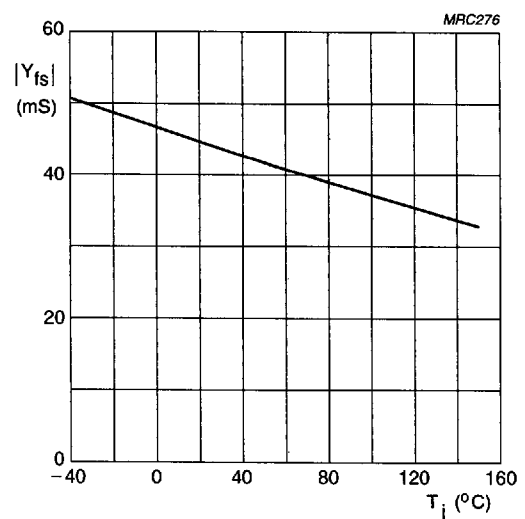
 $V_{DS} = 8 \text{ V}$; $V_{G2-S} = 4 \text{ V}$; $I_D = 15 \text{ mA}$.

Fig.7 Forward transfer admittance as a function of junction temperature; typical values.

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Table 1 Scattering parameters

f (MHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 10 mA; T_{amb} = 25 °C.								
50	0.998	-5.1	3.537	173.5	0.001	98.2	0.996	-2.4
100	0.994	-10.4	3.502	167.7	0.001	88.8	0.994	-4.9
200	0.979	-20.8	3.450	154.9	0.003	74.6	0.987	-9.5
300	0.962	-30.3	3.318	143.7	0.004	69.5	0.983	-13.9
400	0.939	-40.1	3.234	131.9	0.005	65.6	0.980	-18.5
500	0.914	-49.1	3.093	120.7	0.006	64.4	0.974	-22.8
600	0.892	-57.1	2.912	111.1	0.005	63.1	0.969	-27.0
700	0.865	-64.4	2.774	101.0	0.005	65.2	0.966	-31.2
800	0.837	-71.6	2.616	91.4	0.004	70.8	0.965	-35.4
900	0.811	-78.1	2.479	81.9	0.004	87.4	0.965	-39.4
1000	0.785	-84.5	3.329	72.5	0.003	108.0	0.966	-43.7
V_{DS} = 8 V; V_{G2-S} = 4 V; I_D = 15 mA; T_{amb} = 25 °C.								
50	0.998	-5.3	3.983	173.4	0.001	95.5	0.994	-2.4
100	0.994	-10.9	3.943	167.5	0.001	93.6	0.991	-5.0
200	0.976	-21.6	3.878	154.7	0.003	74.3	0.984	-9.7
300	0.957	-31.7	3.722	143.3	0.004	70.0	0.979	-14.2
400	0.934	-41.7	3.614	131.6	0.005	63.5	0.975	-18.8
500	0.907	-51.1	3.446	120.4	0.006	62.2	0.969	-23.2
600	0.885	-59.1	3.240	110.9	0.005	59.6	0.964	-27.4
700	0.851	-66.8	3.072	100.9	0.005	64.8	0.961	-31.6
800	0.826	-73.9	2.891	91.3	0.004	67.8	0.959	-35.9
900	0.797	-80.7	2.733	81.9	0.004	85.0	0.958	-40.0
1000	0.773	-87.0	2.569	72.8	0.004	102.9	0.958	-44.2

Table 2 Noise data

f (MHz)	F _{min} (dB)	Γ _{opt}		r _n
		(ratio)	(deg)	
V _{DS} = 8 V; V _{G2-S} = 4 V; I _D = 10 mA; T _{amb} = 25 °C.				
800	1.50	0.720	56.7	0.580
V _{DS} = 8 V; V _{G2-S} = 4 V; I _D = 15 mA; T _{amb} = 25 °C.				
800	1.50	0.700	59.2	0.520

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PACKAGE OUTLINES

