

# BF908; BF908R

## Dual-gate MOS-FETs

Rev. 03 — 14 November 2007

Product data sheet

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NXP Semiconductors

Dual-gate MOS-FETs

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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

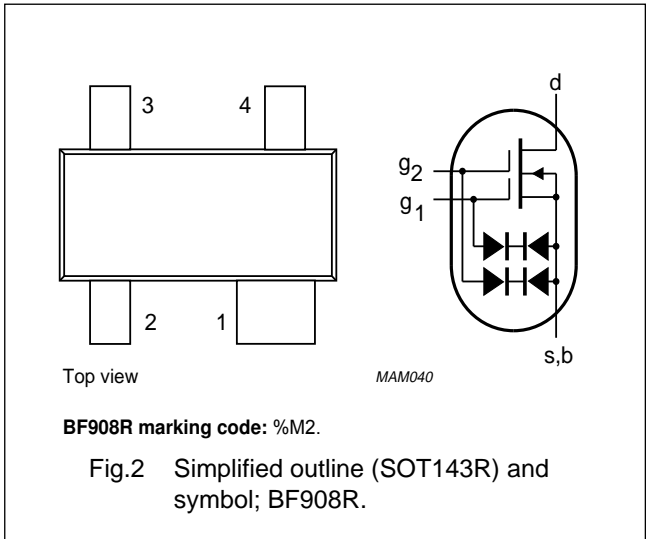
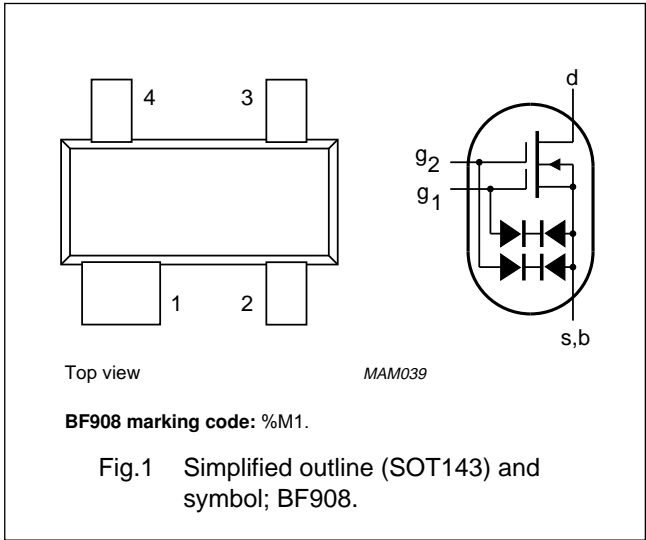
The device is supplied in an antistatic package. The gate-source input must be protected against static discharge during transport or handling.

PINNING

PIN	SYMBOL	DESCRIPTION
1	s, b	source
2	d	drain
3	g <sub>2</sub>	gate 2
4	g <sub>1</sub>	gate 1

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V <sub>DS</sub>	drain-source voltage		–	–	12	V
I <sub>D</sub>	drain current		–	–	40	mA
P <sub>tot</sub>	total power dissipation		–	–	200	mW
T <sub>j</sub>	operating junction temperature		–	–	150	°C
y <sub>fs</sub>	forward transfer admittance		36	43	50	mS
C <sub>ig1-s</sub>	input capacitance at gate 1		2.4	3.1	4	pF
C <sub>rs</sub>	reverse transfer capacitance	f = 1 MHz	20	30	45	pF
F	noise figure	f = 800 MHz	–	1.5	2.5	dB



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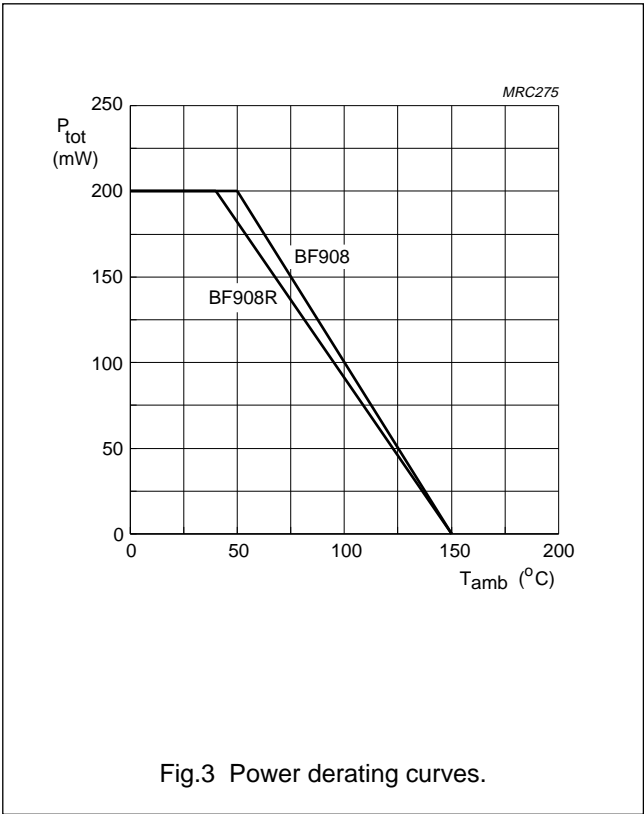
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>DS</sub>	drain-source voltage		–	12	V
I <sub>D</sub>	drain current		–	40	mA
±I <sub>G1</sub>	gate 1 current		–	10	mA
±I <sub>G2</sub>	gate 2 current		–	10	mA
P <sub>tot</sub>	total power dissipation	see Fig.3; note 1			
	BF908	up to T <sub>amb</sub> = 50 °C	–	200	mW
	BF908R	up to T <sub>amb</sub> = 40 °C	–	200	mW
T <sub>stg</sub>	storage temperature		–65	+150	°C
T <sub>j</sub>	operating junction temperature		–	150	°C

Note

1. Device mounted on a printed-circuit board.



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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

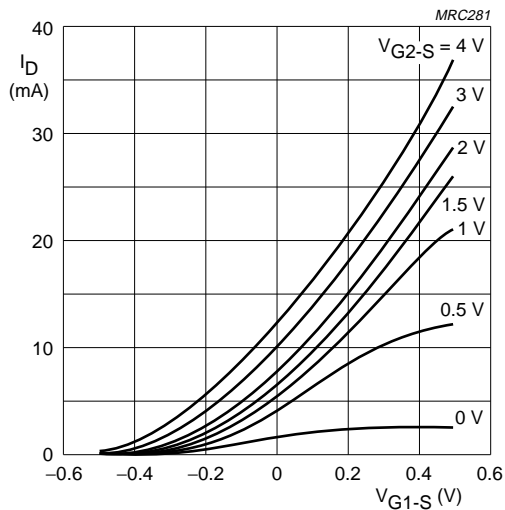
## DYNAMIC CHARACTERISTICS

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

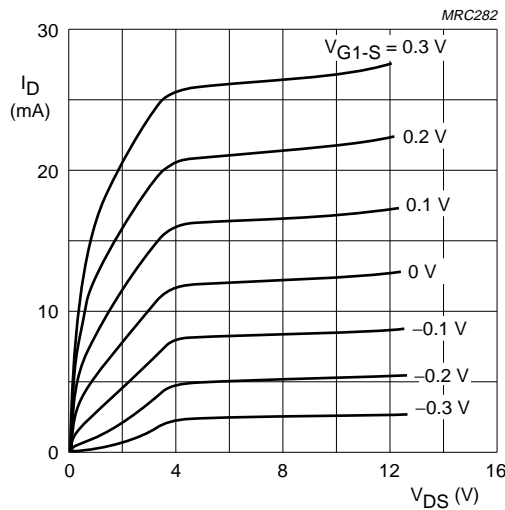
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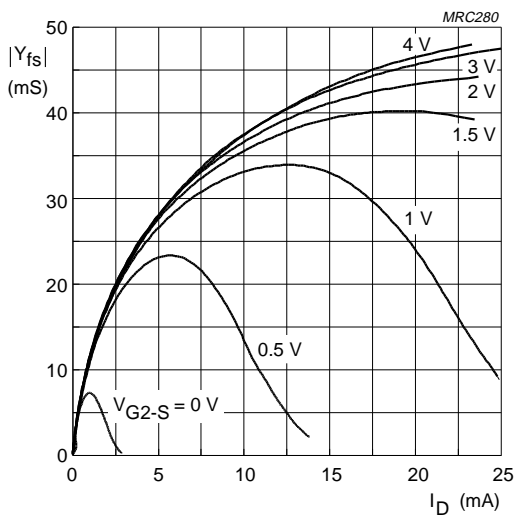
$V_{DS} = 8\text{ V}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

Fig.4 Transfer characteristics; typical values.



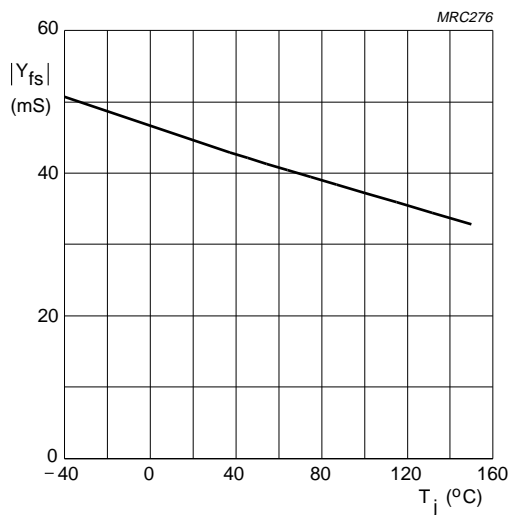
$V_{G2-S} = 4\text{ V}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$ .

Fig.5 Output characteristics; typical values.



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

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 <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)	MAGNITUDE (ratio)	ANGLE (deg)
<b>V<sub>DS</sub> = 8 V; V<sub>G2-S</sub> = 4 V; I<sub>D</sub> = 10 mA; T<sub>amb</sub> = 25 °C.</b>								
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
<b>V<sub>DS</sub> = 8 V; V<sub>G2-S</sub> = 4 V; I<sub>D</sub> = 15 mA; T<sub>amb</sub> = 25 °C.</b>								
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

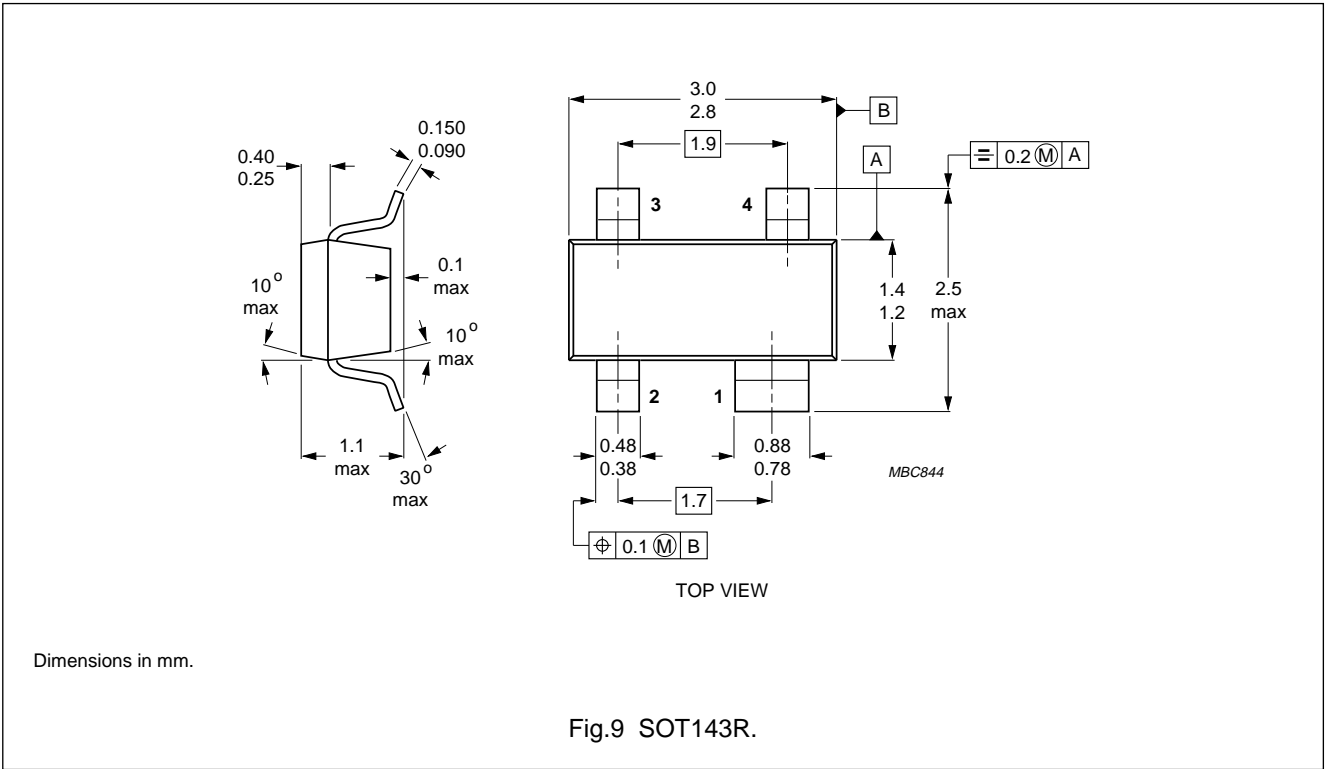
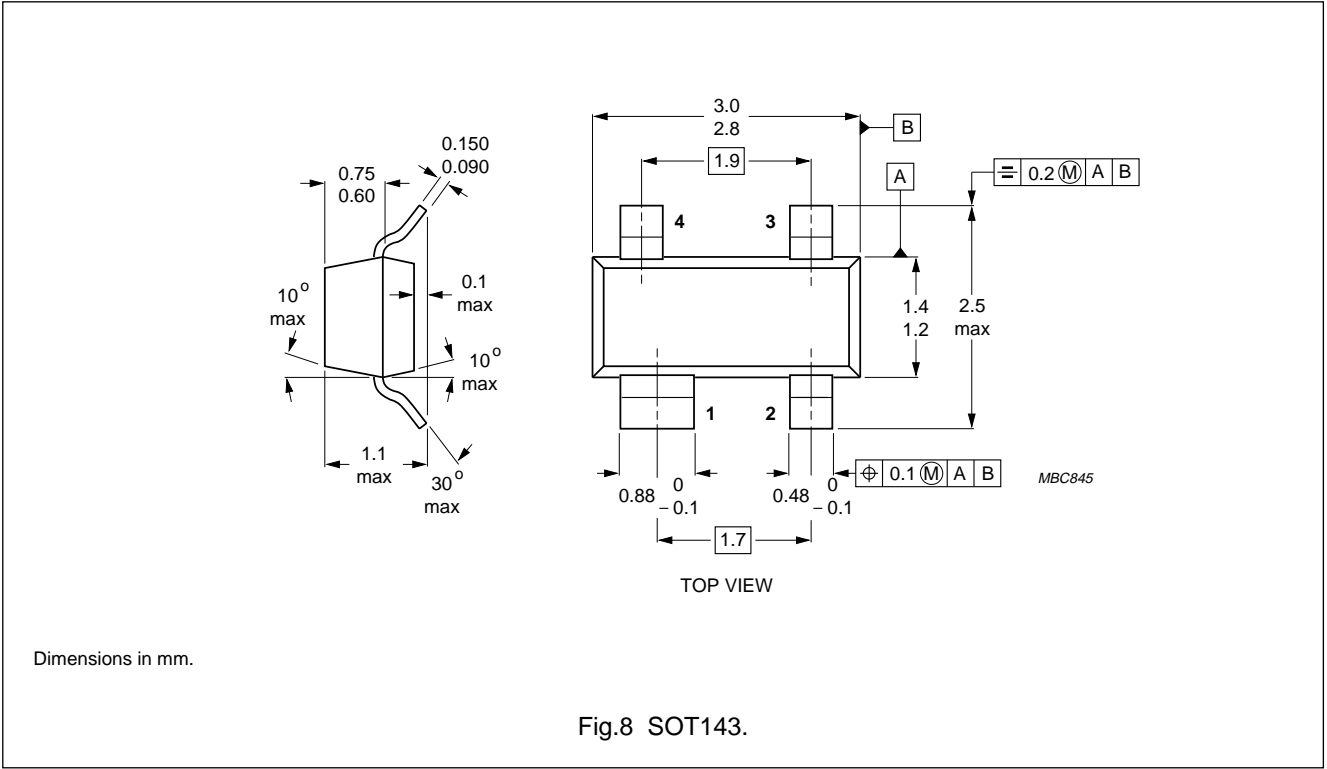
Table 2 Noise data

f (MHz)	F <sub>min</sub> (dB)	Γ <sub>opt</sub>		r <sub>n</sub>
		(ratio)	(deg)	
V <sub>DS</sub> = 8 V; V <sub>G2-S</sub> = 4 V; I <sub>D</sub> = 10 mA; T <sub>amb</sub> = 25 °C.				
800	1.50	0.720	56.7	0.580
V <sub>DS</sub> = 8 V; V <sub>G2-S</sub> = 4 V; I <sub>D</sub> = 15 mA; T <sub>amb</sub> = 25 °C.				
800	1.50	0.700	59.2	0.520

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PACKAGE OUTLINES



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## Revision history

### Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BF908-R_N_3	20071114	Product data sheet	-	BF908-R_2
Modifications:	• Fig. 1 and 2 on page 2; Figure note changed			
BF908-R_2	19960730	Product specification	-	BF908R_1
BF908R_1	-	-	-	-

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