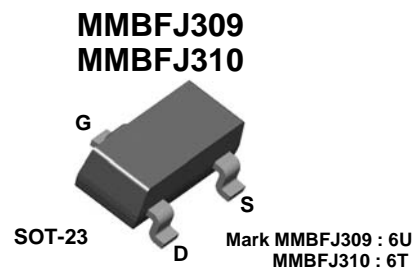


# J309 / J310 / MMBFJ309 / MMBFJ310 N-Channel RF Amplifier

## Features

- This device is designed for VHF/UHF amplifier, oscillator and mixer applications.
- As a common gate amplifier, 16 dB at 100 MHz and 12 dB at 450 MHz can be realized.
- Sourced from Process 92.
- Source & Drain are interchangeable.



## Absolute Maximum Ratings \* $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	25	V
$V_{GS}$	Gate-Source Voltage	-25	V
$I_{GF}$	Forward Gate Current	10	mA
$T_J, T_{stg}$	Operating and Storage Junction Temperature Range	- 55 to +150	$^\circ\text{C}$

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

### NOTES:

- 1) These ratings are based on a maximum junction temperature of 150 degrees C.
- 2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

## Thermal Characteristics $T_a = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Max.		Units
		J309-J310	*MMBFJ309-310	
$P_D$	Total Device Dissipation	625	350	mW
	Derate above $25^\circ\text{C}$	5.0	2.8	mW/ $^\circ\text{C}$
$R_{\theta JC}$	Thermal Resistance, Junction to Case	127		$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	357	556	$^\circ\text{C}/\text{W}$

\* Device mounted on FR-4 PCB 1.6" X 1.6" X 0.06".

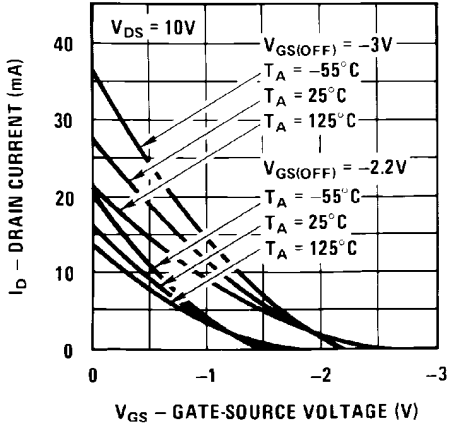
**Electrical Characteristics**  $T_a = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
$BV_{(BR)GSS}$	Gate-Source Breakdown Voltage	$I_G = -1.0\mu\text{A}, V_{DS} = 0$	-25			V
$I_{GSS}$	Gate Reverse Current	$V_{GS} = -15\text{V}, V_{DS} = 0$ $V_{GS} = -15\text{V}, V_{DS} = 0, T_a = 125^\circ\text{C}$			-1.0 -1.0	nA $\mu\text{A}$
$V_{GS(off)}$	Gate-Source Cutoff Voltage	$V_{DS} = 10\text{V}, I_D = 1.0\text{nA}$	<b>309</b> <b>310</b>	-1.0 -2.0	-4.0 -6.5	V V
<b>On Characteristics</b>						
$I_{DSS}$	Zero-Gate Voltage Drain Current*	$V_{DS} = 10\text{V}, V_{GS} = 0$	<b>309</b> <b>310</b>	12 24	30 60	mA mA
$V_{GS(f)}$	Gate-Source Forward Voltage	$V_{DS} = 0, I_G = 1.0\text{mA}$			1.0	V
<b>Small Signal Characteristics</b>						
$Re_{(yis)}$	Common-Source Input Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{MHz}$	<b>309</b> <b>310</b>	0.7 0.5		mmhos mmhos
$Re_{(yos)}$	Common-Source Output Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{MHz}$		0.25		mmhos
$G_{pg}$	Common-Gate Power Gain	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{MHz}$		16		dB
$Re_{(yfs)}$	Common-Source Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{MHz}$		12		mmhos
$Re_{(yig)}$	Common-Gate Input Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{MHz}$		12		mmhos
$g_{fs}$	Common-Source Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 1.0\text{kHz}$	<b>309</b> <b>310</b>	10,000 8,000	20,000 18,000	$\mu\text{mhos}$ $\mu\text{mhos}$
$g_{oss}$	Common-Source Output Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 1.0\text{kHz}$			150	$\mu\text{mhos}$
$g_{fg}$	Common-Gate Forward Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 1.0\text{kHz}$	<b>309</b> <b>310</b>	13,000 12,000		$\mu\text{mhos}$ $\mu\text{mhos}$
$g_{og}$	Common-Gate Output Conductance	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 1.0\text{kHz}$	<b>309</b> <b>310</b>	100 150		$\mu\text{mhos}$ $\mu\text{mhos}$
$C_{dg}$	Drain-Gate Capacitance	$V_{DS} = 0, V_{GS} = -10\text{V}, f = 1.0\text{MHz}$		2.0	2.5	pF
$C_{sg}$	Source-Gate Capacitance	$V_{DS} = 0, V_{GS} = -10\text{V}, f = 1.0\text{MHz}$		4.1	5.0	pF
NF	Noise Figure	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 450\text{MHz}$		3.0		dB
$e_n$	Equivalent Short-Circuit Input Noise Voltage	$V_{DS} = 10\text{V}, I_D = 10\text{mA}, f = 100\text{Hz}$		6.0		nV/ $\sqrt{\text{Hz}}$

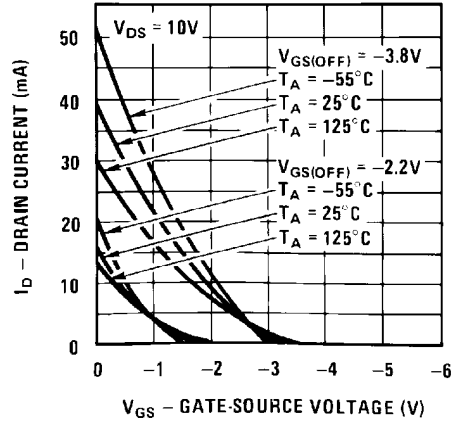
\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$

Typical Performance Characteristics

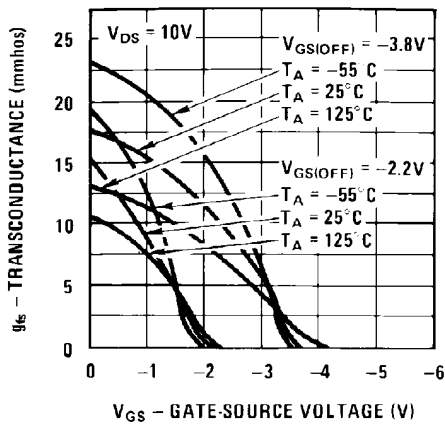
Transfer Characteristics



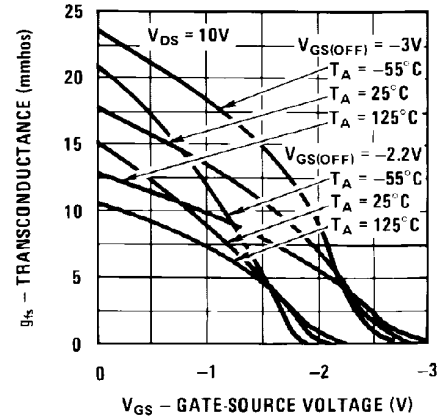
Transfer Characteristics



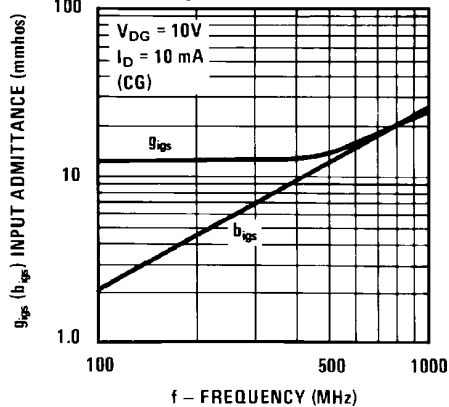
Transfer Characteristics



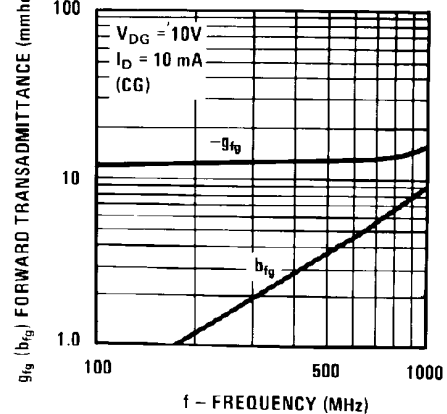
Transfer Characteristics



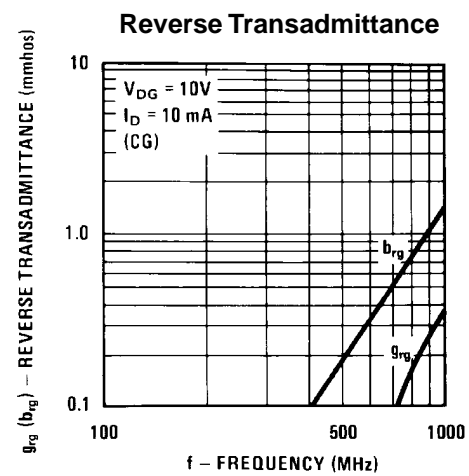
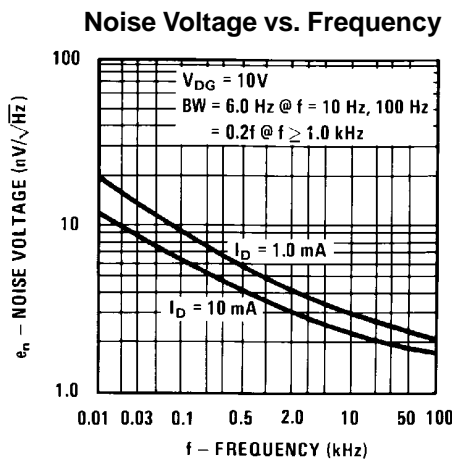
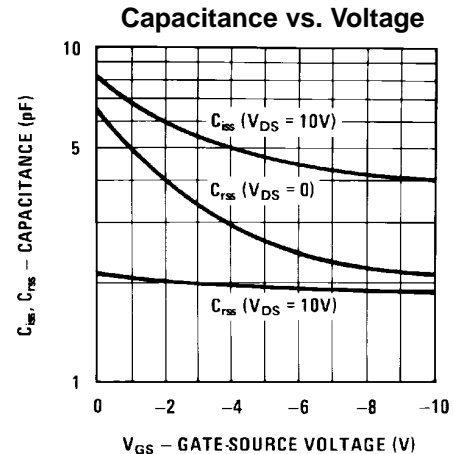
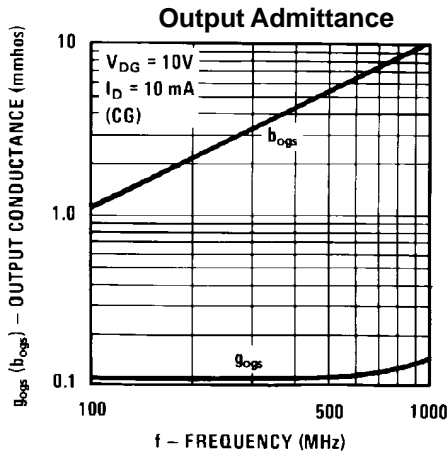
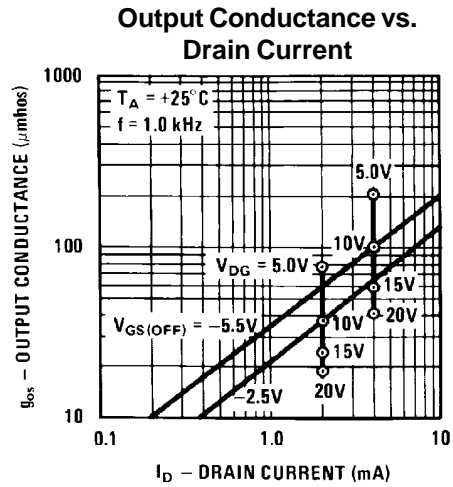
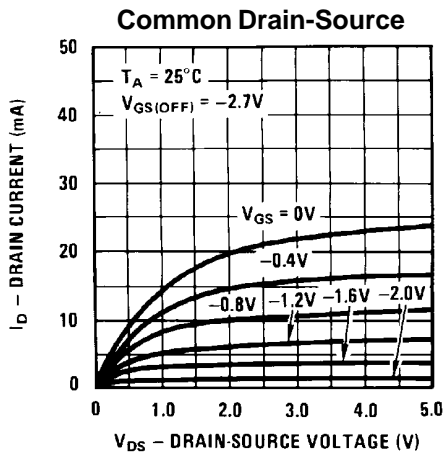
Input Admittance



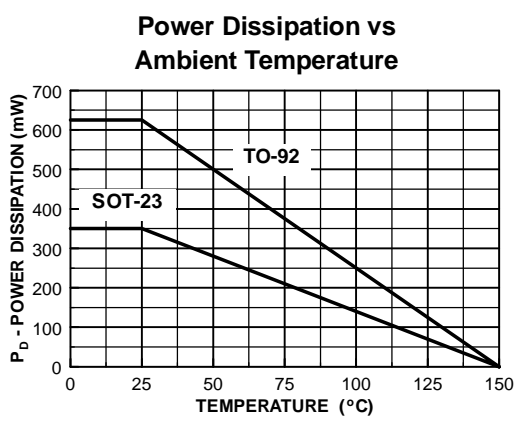
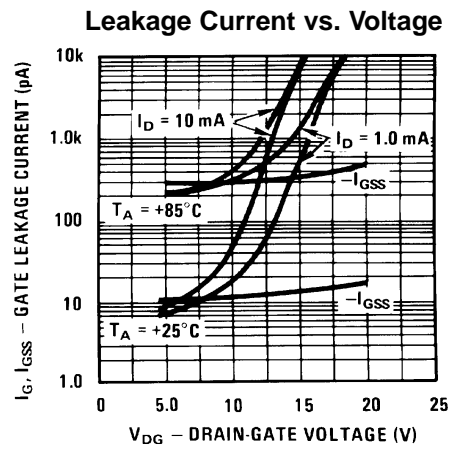
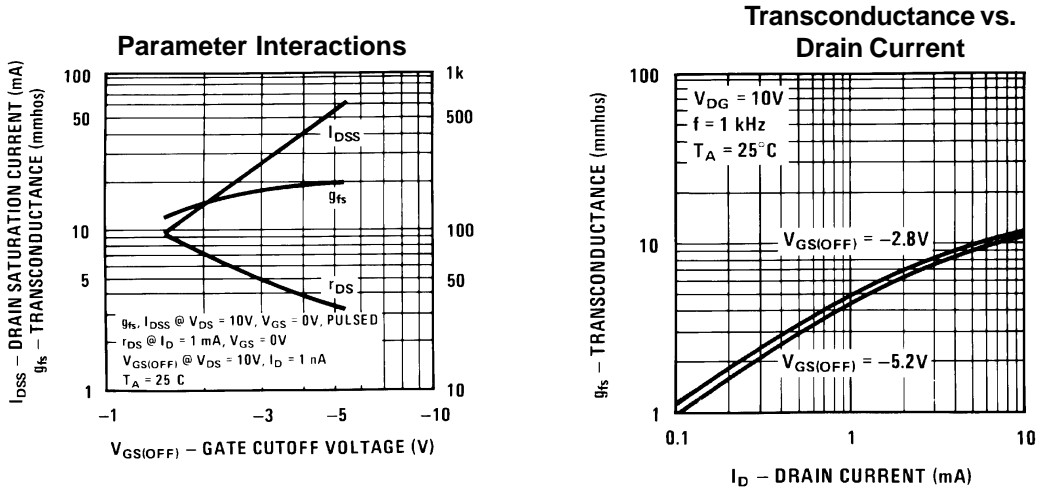
Forward Transadmittance



Typical Performance Characteristics (continued)



Typical Performance Characteristics (continued)





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