FAIRCHILD SEMICONDUCTOR®

December 2010

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

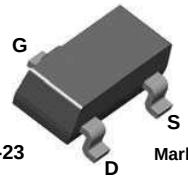
Features

- 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.

J309
J310

TO-92

MMBFJ309
MMBFJ310



SOT-23

Mark MMBFJ309 : 6U
MMBFJ310 : 6T

Absolute Maximum Ratings * T_a = 25°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	°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°C unless otherwise noted

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

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

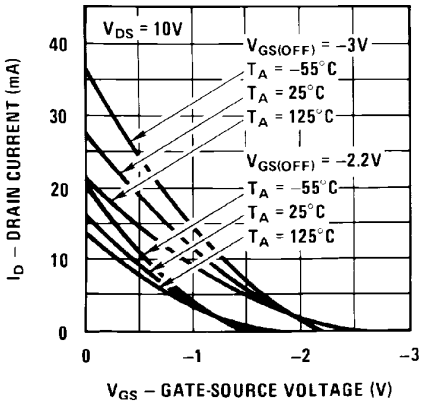
Electrical Characteristics T_a = 25°C unless otherwise noted

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

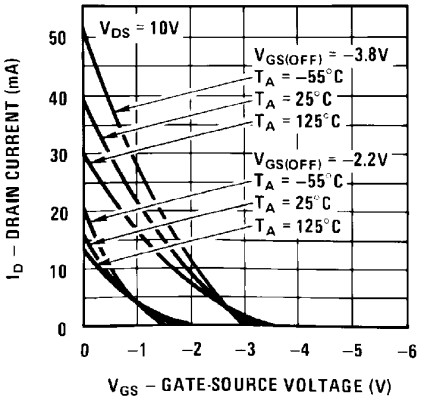
* Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

Typical Performance Characteristics

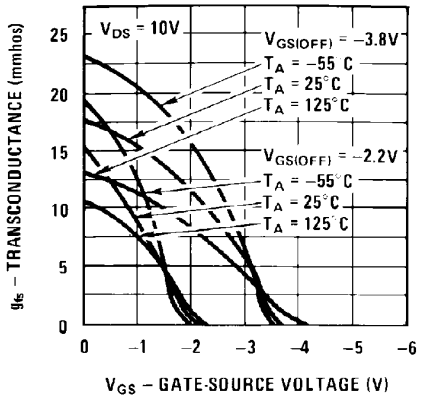
Transfer Characteristics



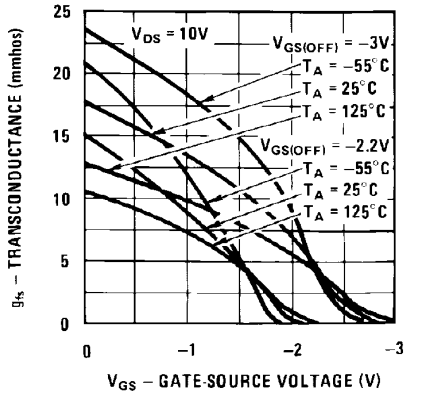
Transfer Characteristics



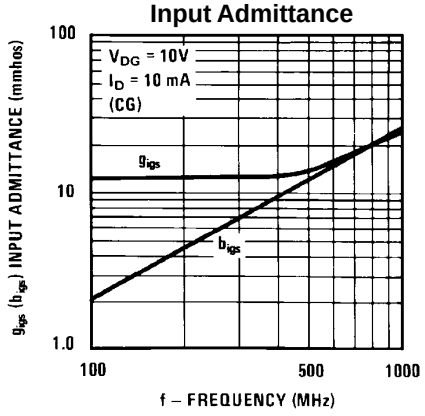
Transfer Characteristics



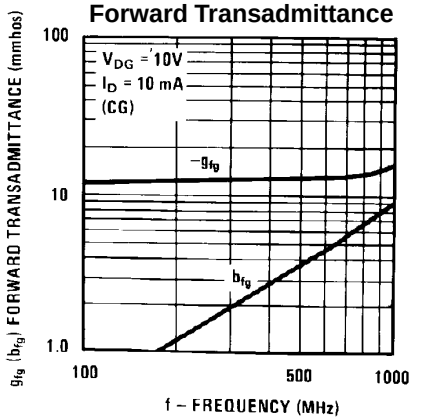
Transfer Characteristics



Input Admittance

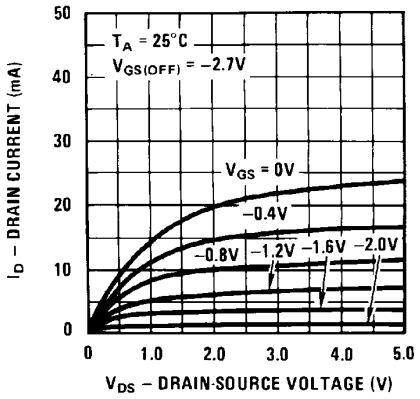


Forward Transadmittance

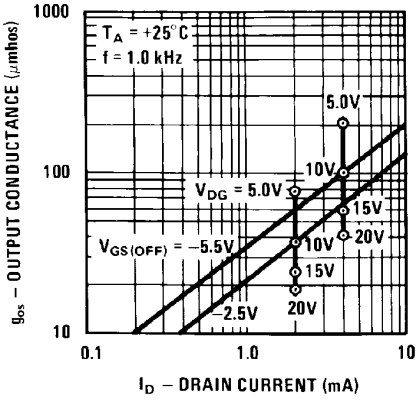


Typical Performance Characteristics (continued)

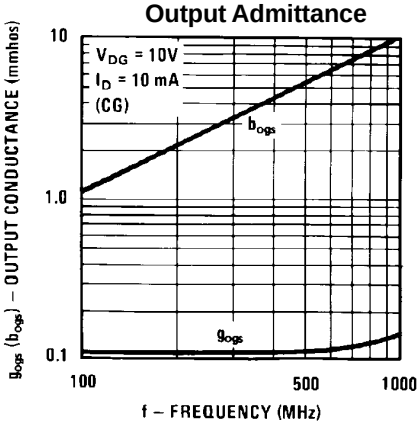
Common Drain-Source



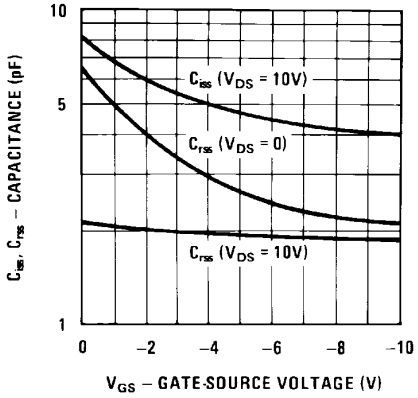
Output Conductance vs. Drain Current



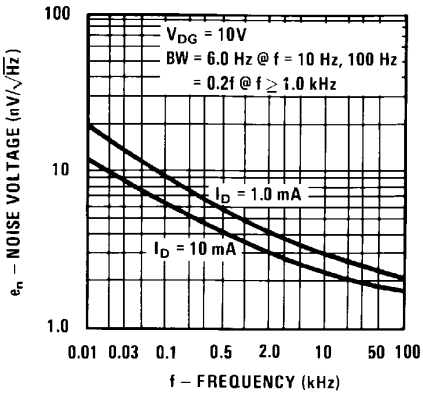
Output Admittance



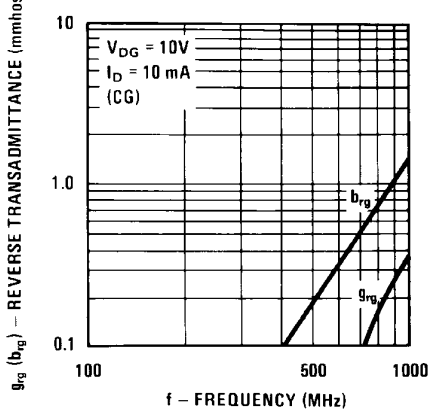
Capacitance vs. Voltage



Noise Voltage vs. Frequency

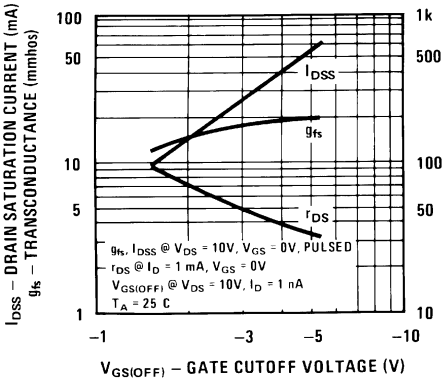


Reverse Transadmittance

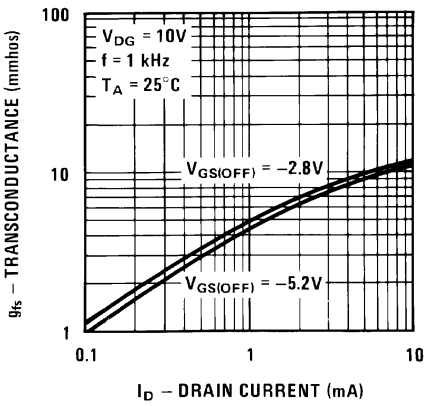


Typical Performance Characteristics (continued)

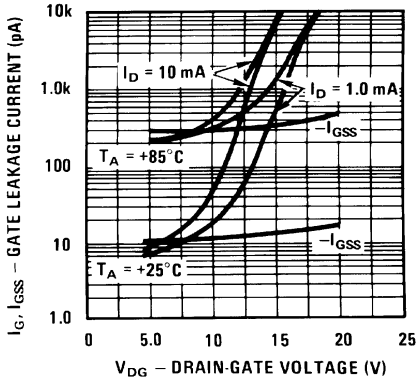
Parameter Interactions



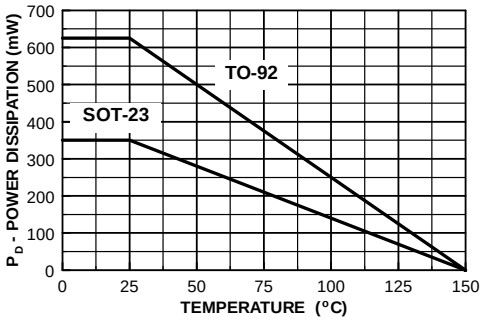
Transconductance vs. Drain Current



Leakage Current vs. Voltage



Power Dissipation vs Ambient Temperature



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