MPF521

CASE 317-01, STYLE 1

MOSFET
DUAL GATE
VHF AMPLIFIER TRANSISTOR

N-CHANNEL — ENHANCEMENT

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	25	Vdc
Drain-Gate Voltage	V_{DG1} V_{DG2}	30 30	Vdc
Drain Current	I_D	30	mAdc
Gate Current	I_{G1F} I_{G2F}	10 10	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	300 1.71	mW mW/°C
Operating Channel Temperature	$T_{channel}$	150	°C
Lead Temperature, 1/16" From Seated Surface for 10 Seconds	T_L	200	°C
Storage Channel Temperature Range	T_{stg}	−65 to +150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

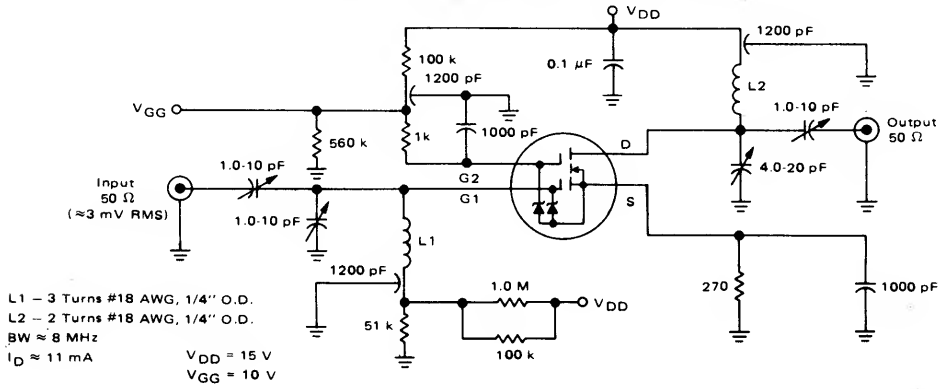
Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Gate 1-Source Breakdown Voltage (V_{G2} = V_{DS} = 0, I_{G1} = 10 μAdc)	$V_{(BR)G1SO}$	10	15	—	Vdc
Gate 2-Source Breakdown Voltage (V_{G1S} = V_{DS} = 0, I_{G2} = 10 μAdc)	$V_{(BR)G2SO}$	12	16	—	Vdc
Gate 1 Reverse Leakage Current (V_{G1S} = 5.0 Vdc, V_{G2S} = V_{DS} = 0)	I_{G1SS}	—	30	100	nAdc
Gate 2 Reverse Leakage Current (V_{G2S} = 5.0 Vdc, V_{G1S} = V_{DS} = 0)	I_{G2SS}	—	30	100	nAdc
Drain-Source Breakdown Voltage (V_{G2} = 0, I_D = 10 μAdc)	$V_{(BR)DS}$	25	28	—	Vdc
ON CHARACTERSTICS					
Gate-Source Threshold Voltage (V_{G2S} = 10 Vdc, I_D = 10 μAdc, V_{DS} = 15 V) (V_{G1S} = 4.0 Vdc, I_D = 10 μAdc, V_{DS} = 15 V)	$V_{G1S(TH)}$ $V_{G2S(TH)}$	 0.5 0.5	 1.2 1.0	 2.0 2.0	Vdc
Gate-Source On Voltage (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc)	$V_{G1S(on)}$	2.0	2.6	4.0	Vdc
"On" Drain Current (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, V_{G1S} = 3.0 Vdc)	$I_{D(on)}$	5.0	15	20	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance(1) (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc, f = 1.0 kHz) (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc, f = 200 MHz)	$\lvert Y_{fs}\rvert$ y_{fs}	10 —	12 10.57-j6.86	20 —	mmhos
Input Admittance(1) (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc, f = 200 MHz)	y_{is}	—	0.524 + j4.27	—	mmhos
Reverse Transfer Admittance(1) (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc, f = 200 MHz)	y_{rs}	—	-1.7-j9.8	—	μmhos
Output Admittance(1) (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, I_D = 10 mAdc, f = 200 MHz)	$\lvert y_{os}\rvert$	—	0.126 + j1.79	—	mmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, V_{G1} = 2.5 Vdc, f = 1.0 MHz)	C_{iss}	—	3.3	4.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, V_{G1} = 2.5 Vdc, f = 1.0 MHz)	C_{rss}	—	0.015	0.03	pF
Output Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 10 Vdc, V_{G1} = 2.5 Vdc, f = 1.0 MHz)	C_{oss}	—	1.1	2.5	pF

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL CHARACTERISTICS					
Noise Figure (Figures 1 and 9) (V_{DS} = 15 Vdc, V_{GG} = 10 V, f = 200 MHz)	NF	—	1.7	3.5	dB
Common Source Power Gain (Figures 1 and 9) (V_{DS} = 15 Vdc, V_{GG} = 10 V, f = 200 MHz, BW = 7.0 MHz (Min))	G_{ps}	21	25	—	dB

(1) All y-parameters are with respect to Gate 1.

FIGURE 1 – 200 MHz NOISE FIGURE AND POWER GAIN TEST CIRCUIT



TYPICAL CHARACTERISTICS

FIGURE 2 – DRAIN CURRENT versus DRAIN to SOURCE VOLTAGE

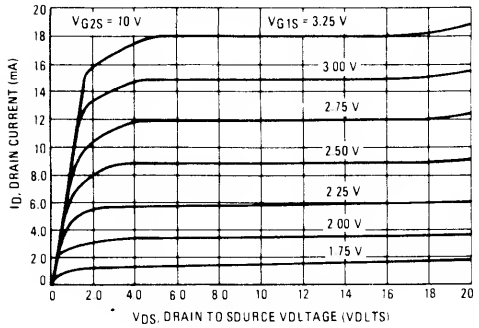


FIGURE 3 – DRAIN CURRENT versus GATE-ONE to SOURCE VOLTAGE

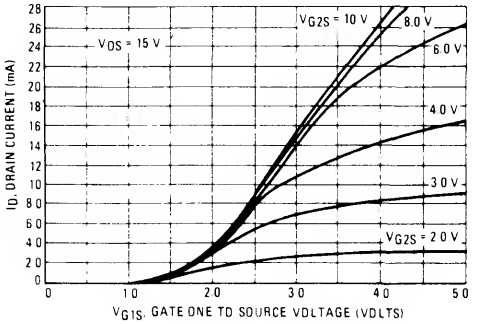


FIGURE 4 – SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus GATE-ONE to SOURCE VOLTAGE

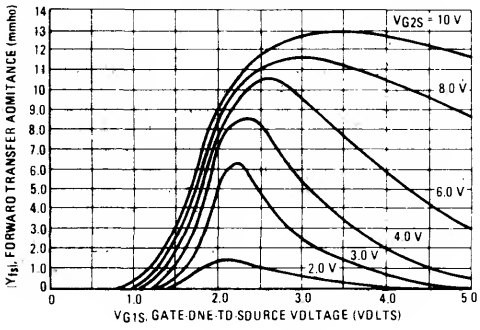


FIGURE 5 – SMALL-SIGNAL COMMON-SOURCE GATE-ONE FORWARD TRANSFER ADMITTANCE versus DRAIN CURRENT

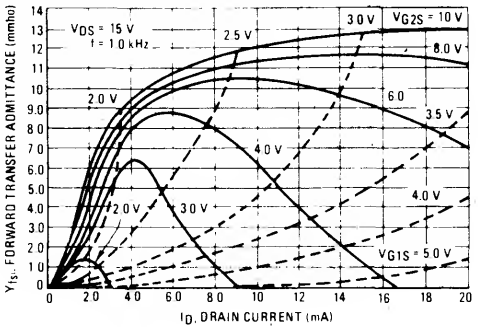


FIGURE 6 – SMALL-SIGNAL COMMON-SOURCE GATE-ONE INPUT AND OUTPUT CAPACITANCE versus GATE-TWO to SOURCE VOLTAGE

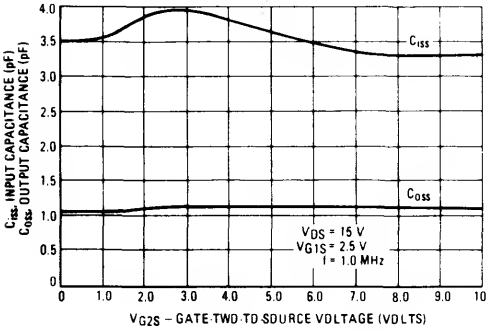


FIGURE 7 – COMMON SOURCE POWER GAIN versus DRAIN SUPPLY CURRENT

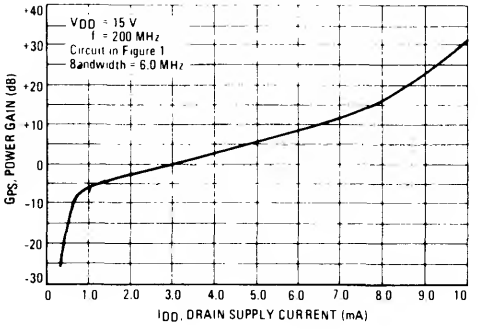


FIGURE 8 – COMMON SOURCE POWER GAIN AND SPOT NOISE FIGURE versus DRAIN CURRENT

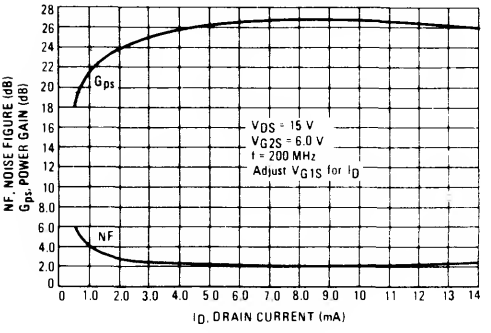


FIGURE 9 – COMMON SOURCE POWER GAIN AND SPOT NOISE FIGURE versus GAIN CONTROL GATE-SUPPLY VOLTAGE

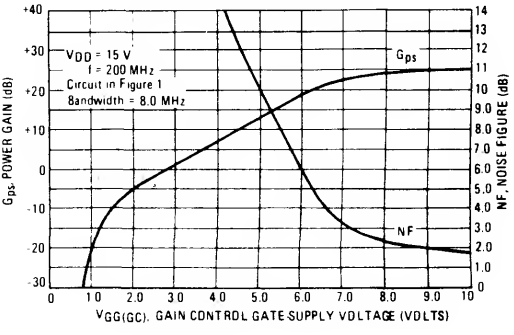


FIGURE 10 – SMALL-SIGNAL GATE ONE INPUT ADMITTANCE versus FREQUENCY

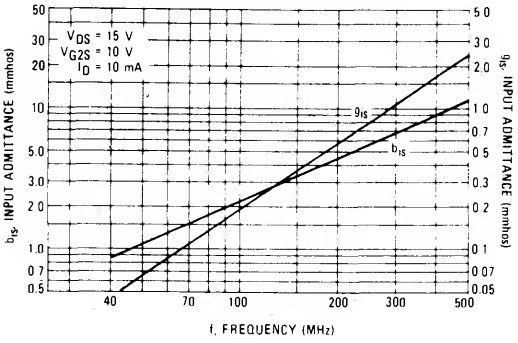


FIGURE 11 – SMALL-SIGNAL COMMON SOURCE GATE ONE FORWARD TRANSFER ADMITTANCE versus FREQUENCY

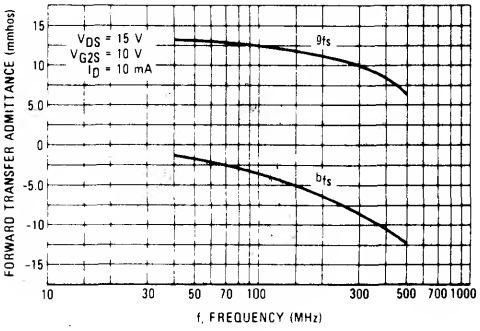


FIGURE 12 – SMALL-SIGNAL COMMON SOURCE OUTPUT ADMITTANCE versus FREQUENCY

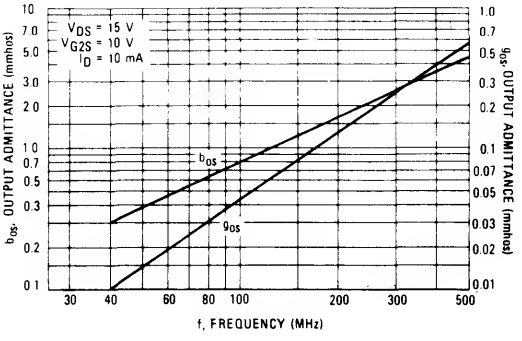
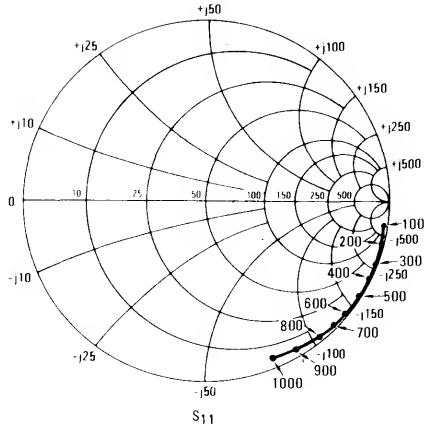
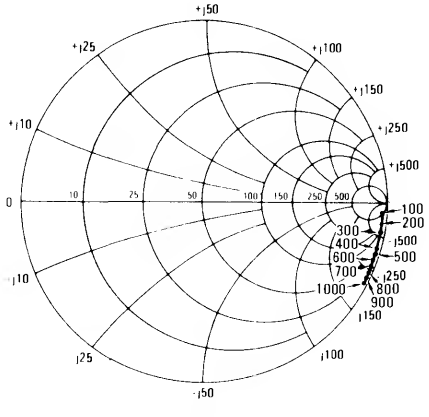


FIGURE 13 – INPUT/OUTPUT IMPEDANCE





V_{DD} = 18 V
V_{GG} = 10 V
I_D 10 mA