3N128

CASE 20-03, STYLE 7
TO-72 (TO-206AF)

MOSFET
AMPLIFIER

N-CHANNEL — DEPLETION

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	+20	Vdc
Drain-Gate Voltage	V_{DG}	+20	Vdc
Gate-Source Voltage	V_{GS}	±10	Vdc
Drain Current	I_D	50	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	330 2.2	mW mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +175	°C

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Gate-Source Breakdown Voltage(1) (I_G = −10 μAdc, V_{DS} = 0)	$V_{(BR)GSS}$	−50	—	Vdc
Gate Reverse Current (V_{GS} = −8.0 Vdc, V_{DS} = 0) (V_{GS} = −8.0 Vdc, V_{DS} = 0, T_A = 125°C)	I_{GSS}	 — —	 0.05 5.0	nAdc
Gate Source Cutoff Voltage (V_{DS} = 15 Vdc, I_D = 50 μAdc)	$V_{GS(off)}$	−0.5	−8.0	Vdc
ON CHARACTERISTICS				
Zero-Gate-Voltage Drain Current(2) (V_{DS} = 15 Vdc, V_{GS} = 0)	I_{DSS}	5.0	25	mAdc
SMALL-SIGNAL CHARACTERISTICS				
Forward Transfer Admittance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 kHz)	$\|Y_{fs}\|$	5000	12,000	μmhos
Input Admittance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{is})$	—	800	μmhos
Output Conductance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{os})$	—	500	μmhos
Forward Transconductance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	$Re(y_{fs})$	5000	—	μmhos
Input Capacitance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 MHz)	C_{iss}	—	7.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 1.0 MHz)	C_{rss}	0.05	0.35	pF
FUNCTIONAL CHARACTERISTICS				
Noise Figure (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	NF	—	5.0	dB
Power Gain (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 200 MHz)	P_G	13.5	23	dB

(1) Caution Destructive Test, can damage gate oxide beyond operation.
(2) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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TYPICAL CHARACTERISTICS
(T_A = 25°C)

FIGURE 1 – DRAIN CHARACTERISTICS

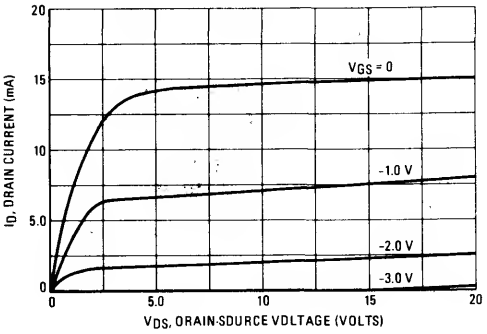
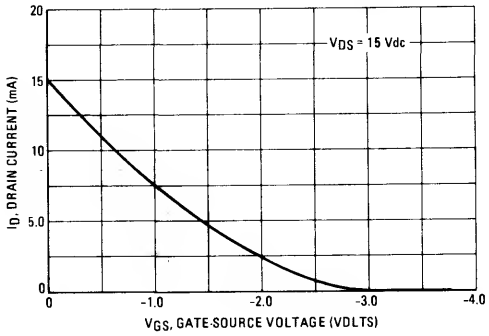


FIGURE 2 – TRANSFER CHARACTERISTICS



TYPICAL 1 kHz DRAIN CHARACTERISTICS
(T_A = 25°C, V_{DS} = 15 Vdc, f = 1.0 kHz)

FIGURE 3 – FORWARD TRANSADMITTANCE versus GATE BIAS VOLTAGE

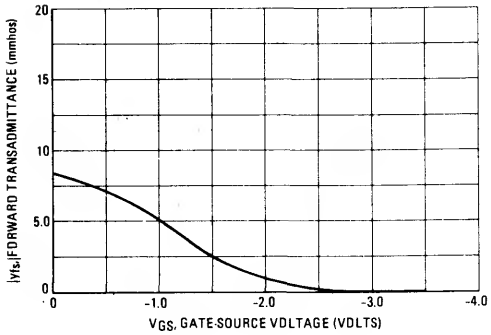
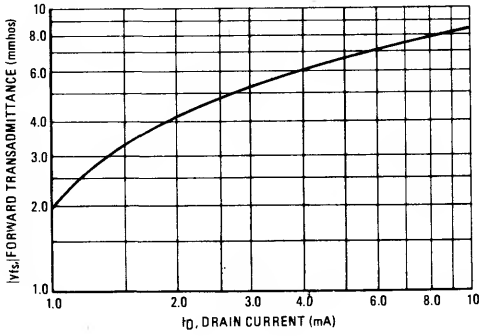


FIGURE 4 – FORWARD TRANSADMITTANCE versus DRAIN CURRENT



TYPICAL 200 MHz COMMON-SOURCE ADMITTANCE CHARACTERISTICS
(T_A = 25°C, V_{DS} = 15 Vdc, f = 200 MHz)

FIGURE 5 – INPUT ADMITTANCE (y_{is}) COMPONENTS

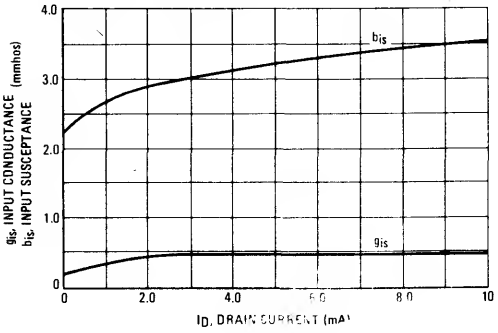


FIGURE 6 – FORWARD TRANSADMITTANCE (y_{fs}) COMPONENTS

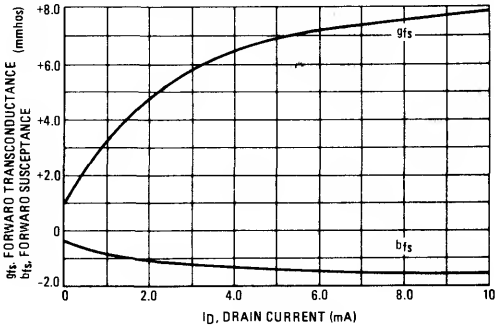


FIGURE 7 – REVERSE TRANSADMITTANCE (y_{rs}) COMPONENTS

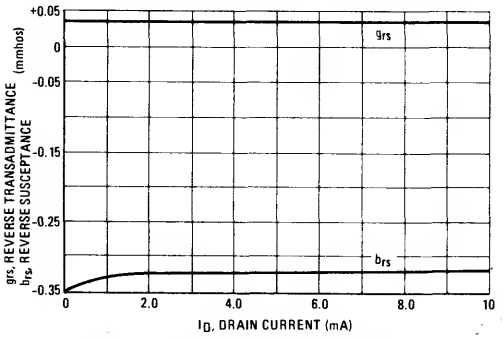


FIGURE 8 – OUTPUT ADMITTANCE (y_{os}) COMPONENTS

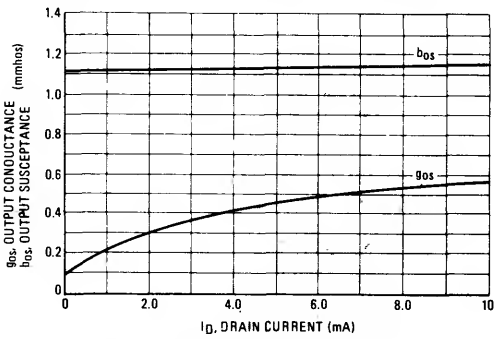


FIGURE 9 – POWER GAIN AND NOISE FIGURE versus DRAIN CURRENT

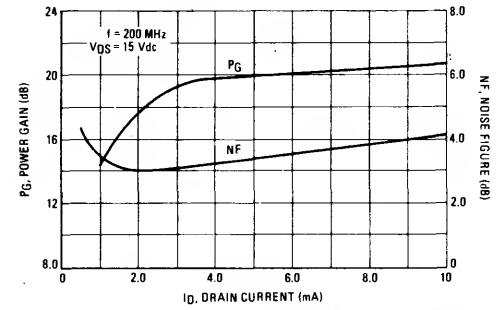


FIGURE 10 – POWER GAIN AND NOISE FIGURE versus DRAIN VOLTAGE

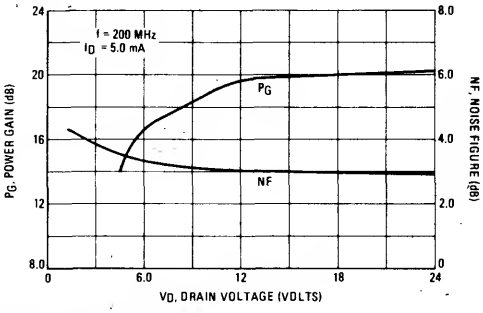


FIGURE 11 – THIRD ORDER INTERMODULATION DISTORTION

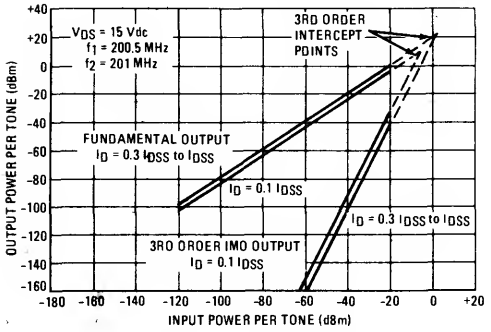
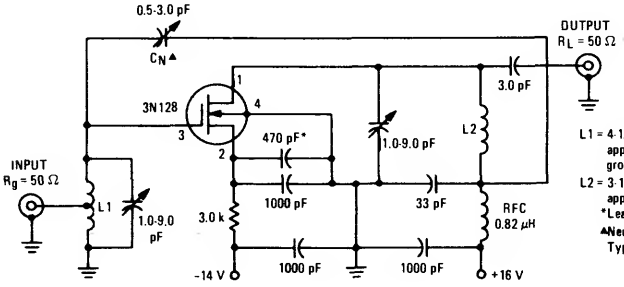


Figure 11 shows the typical third order intermodulation distortion (IMD) performance of the 3N128 at 200 MHz.

Both fundamental output and third order IMD output characteristics are plotted. The curves have been extrapolated to show the third order intermodulation output intercept point.

Performance for drain currents from I_{DSS} to 0.1 I_{DSS}, is given. The power gain and noise figure test amplifier shown in Figure 12 was used to generate the IMD data.

FIGURE 12 – POWER GAIN, NOISE FIGURE AND INTERMODULATION DISTORTION TEST CIRCUIT



L1 = 4-1/2 turns #20 AWG wire, 3/16" diameter, approximately 1/2" long, tapped 1 turn from ground end.

L2 = 3-1/2 turns #20 AWG wire, 3/8" diametar, approximately 1/2" long

*Leadless-type disc capacitor

▲Neutralization fixed for a Transistor having a Typical value of C_{rss} (0.13 pF)