

3N124 (SILICON)

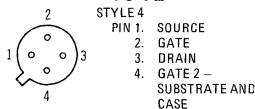
3N125

3N126



N-channel silicon annular tetrode-connected field-effect transistors, designed for low-power switching and amplifier applications in the audio through VHF frequency range, features high breakdown voltage, low transfer capacitance, and tetrode configuration for a broad range of applications.

CASE 20
TO-72



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Reverse Gate-Source Voltage Gate 1 Gate 2	V_{G1S} V_{G2S}	50 50	Vdc
Drain-Source Voltage	V_{DS}	50	Vdc
Drain-Gate Voltage Gate 1 Gate 2	V_{DG1} V_{DG2}	50 50	Vdc
Gate 1-Gate 2 Current	I_{G1G2}	1.0	mAdc
Gate 2-Gate 1 Current	I_{G2G1}	1.0	mAdc
Gate Current Gate 1 Gate 2	I_{G1} I_{G2}	20 20	mAdc
Drain Current	I_D	20	mAdc
Junction Operating Temperature	T_J	175	°C
Storage Temperature Range	T_{stg}	-65 to +175	°C
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate Above 25°C	P_D	300 1.71	mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	800 4.57	mW mW/°C

3N124, 3N125, 3N126 (continued)

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

Characteristic	Symbol	Min	Max	Unit
Gate-Source Breakdown Voltage (I _G = 10 μA, V _{DS} = 0, V _{G1G2} = 0)	V _{(BR)GSS}	50	-	Vdc
Gate Reverse Current (V _{GS} = 25 Vdc, V _{DS} = 0, V _{G1G2} = 0) (V _{GS} = 25 Vdc, V _{DS} = 0, V _{G1G2} = 0, T _A = +150°C)	I _{GSS}	-	0.250 250	nA μA
Zero-Gate-Voltage Drain Current (V _{DS} = 15 Vdc, V _{G1G2} = 0, V _{GS} = 0)	I _{DSS}	0.2 1.5 3.0	2.0 4.5 9.0	mA
Gate-Source Voltage (I _D = 20 μA, V _{DS} = 15 Vdc, V _{G1G2} = 0) (I _D = 150 μA, V _{DS} = 15 Vdc, V _{G1G2} = 0) (I _D = 300 μA, V _{DS} = 15 Vdc, V _{G1G2} = 0)	V _{GS}	0.2 1.0 1.5	2.0 3.0 5.5	Vdc
Gate-Source Cutoff Voltage (V _{DS} = 15 Vdc, I _D = 1.0 μA, V _{G1G2} = 0)	V _{GS(off)}	-	-2.5 -4.0 -6.5	Vdc
Gate 1-Source Cutoff Voltage (V _{DS} = 15 Vdc, I _D = 1.0 μA, V _{G2S} = 0)	V _{G1S(off)}	-	-5.0 -8.0 -18	Vdc
Gate 2-Source Cutoff Voltage (V _{DS} = 15 Vdc, I _D = 1.0 μA, V _{G1S} = 0)	V _{G2S(off)}	-	-8.0 -14 -26	Vdc
Gate 1-Gate 2 Reach Through Voltage (I _{G1G2} = 10 μA, I _S = 0, I _D = 0)	V _{G1G2}	1.0 3.0 5.0	- - -	Vdc
Gate 2-Gate 1 Reach Through Voltage (I _{G2G1} = 10 μA, I _S = 0, I _D = 0)	V _{G2G1}	2.0 6.0 10	- - -	Vdc
Gate 1-Gate 2 Reach Through Drain Current (V _{DS} = 15 Vdc, I _{G1} = 10 μA, V _{G2S} = 0)	I _D	-	1.0	μA
Gate 2-Gate 1 Reach Through Drain Current (V _{DS} = 15 Vdc, I _{G2} = 10 μA, V _{G1S} = 0)	I _D	-	1.0	μA

SMALL-SIGNAL COMMON-SOURCE CHARACTERISTICS

Forward Transfer Admittance (V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, f = 1.0 kHz)				μhos
Gate 1-Gate 2	3N124 3N125 3N126	y _{fs}	500 800 1200	2000 2400 3600
Gate 1 Only	3N124 3N125 3N126	y _{fs1}	250 450 600	1000 1600 2700
Gate 2 Only	3N124 3N125 3N126	y _{fs2}	200 250 400	800 1000 1200
(V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, f = 100 MHz)				
Gate 1 Only	3N124 3N125 3N126	y _{fs1}	250 400 600	- - -
Output Admittance (V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, f = 1.0 kHz)	3N124 3N125 3N126	y _{os}	- - -	2.0 10 20
Input Capacitance (V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, f = 1.0 kHz)				pF
Gate 1-Gate 2		C _{iss}	-	14
Gate 1 Only		C _{iss1}	-	5.0
Gate 2 Only		C _{iss2}	-	3.0
Reverse Transfer Capacitance (V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, f = 1.0 kHz)				pF
Gate 1-Gate 2		C _{rss}	-	2.0
Gate 1 Only		C _{rss1}	-	0.5
Gate 2 Only		C _{rss2}	-	1.5
Spot Noise Figure (V _{DS} = 15 Vdc, V _{G1S} = V _{G2S} = 0, R _S = 1.0 megohm, f = 1.0 kHz, BW = 100 Hz)		NF	-	4.0
Static Drain-Source "ON" Resistance (V _{GS} = 0, V _{DS} = 0)	3N124 3N125 3N126	r _{DS(on)}		ohms
			Typ	
			1000 750 500	

FIGURE 1 — DRAIN CURRENT versus GATE SOURCE VOLTAGE

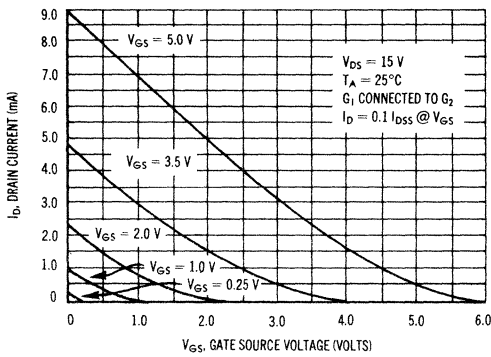


FIGURE 2 — PARAMETER INTER-RELATIONSHIPS

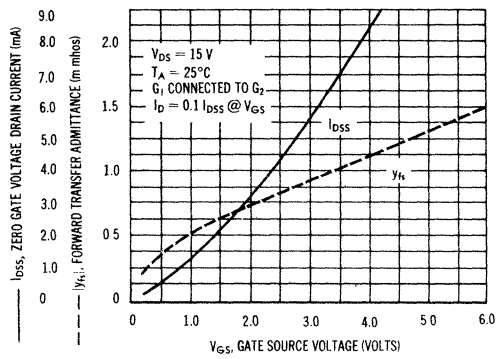


FIGURE 3 — FORWARD TRANSFER ADMITTANCE versus DRAIN CURRENT

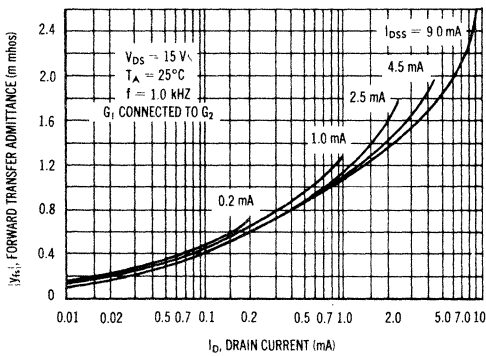
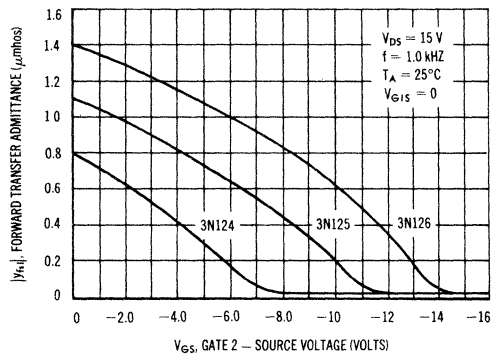


FIGURE 4 GATE 1 — FORWARD TRANSFER ADMITTANCE versus GATE 2 — SOURCE VOLTAGE



NOISE CHARACTERISTICS

$V_{DS} = 15\text{ Vdc}$, $I_D = I_{DSS}$, $T_A = 25^\circ\text{C}$
GATE 1 CONNECTED TO GATE 2

FIGURE 5A — FREQUENCY VARIATIONS

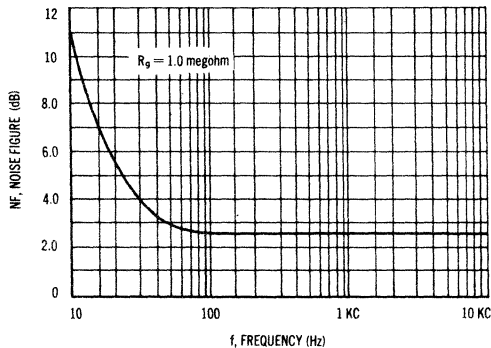
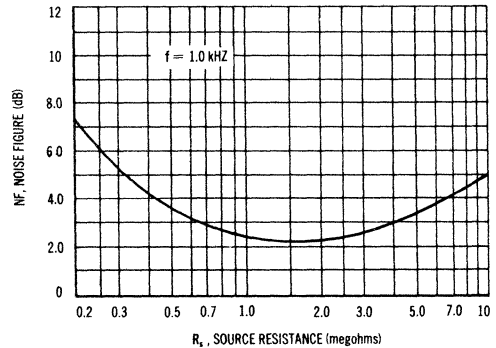


FIGURE 5B — SOURCE RESISTANCE VARIATIONS



3N124, 3N125, 3N126 (continued)

HIGH FREQUENCY y PARAMETER CHARACTERISTICS

$V_{GS} = 15$ Vdc, $V_{DS} = 0$, $T_A = 25^\circ\text{C}$ — GATE 2 CONNECTED TO SOURCE

FIGURE 6 — INPUT ADMITTANCE

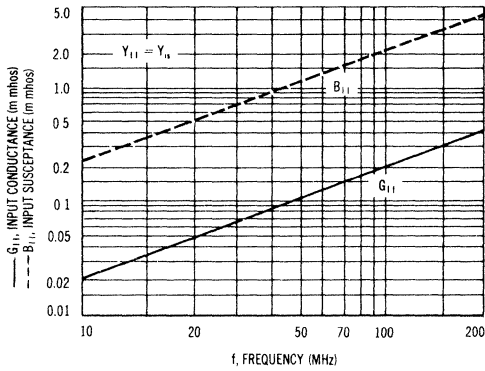


FIGURE 7 — REVERSE TRANSFER ADMITTANCE

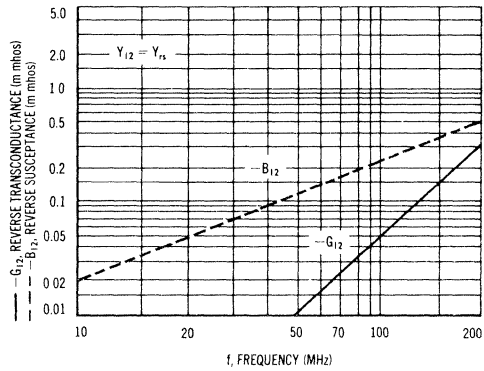


FIGURE 8 — FORWARD TRANSFER ADMITTANCE

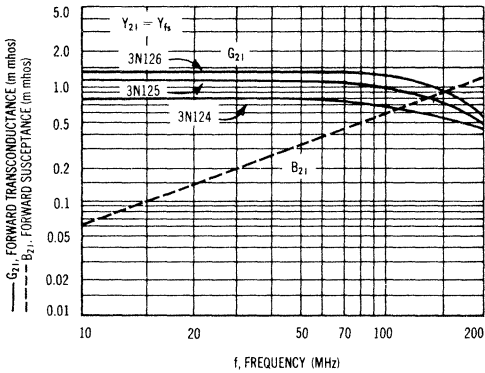
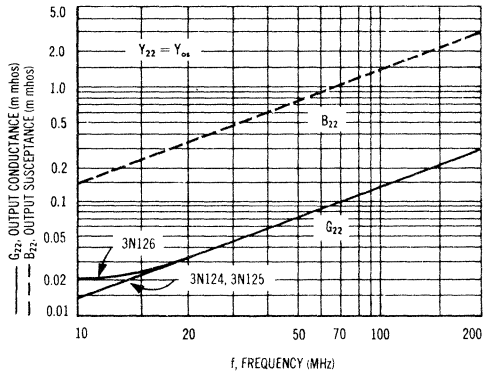
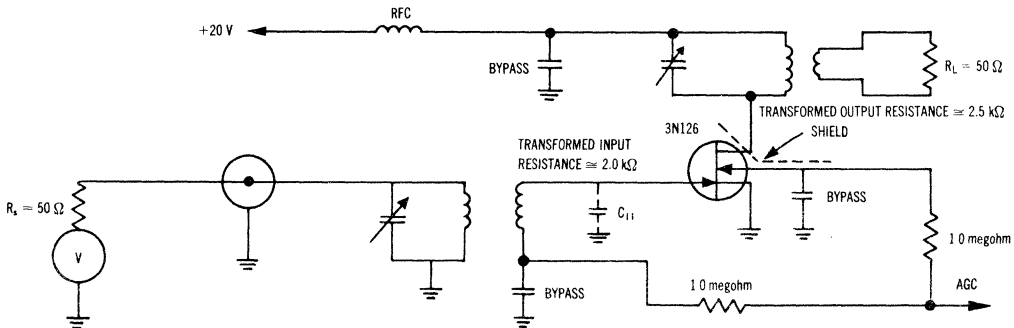


FIGURE 9 — OUTPUT ADMITTANCE



TYPICAL PERFORMANCE USING THE 3N126



CIRCUIT POWER GAIN = 8.0 dB* TYPICAL AT 105 MHz (AGC = 0V)

*Includes circuit losses.