2N4416 (SILICON)

Silicon N-channel junction field-effect transistor designed for VHF/UHF amplifier applications.

CASE 20 (1)
(TO-72)

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	Vdc
Drain-Gate Voltage	V_{DG}	30	Vdc
Gate-Source Voltage	V_{GS}	30	Vdc
Gate Current	I_G	10	mAdc
Total Device Dissipation @ T_A @ 25°C Derate above 25°C	P_D	300 1.7	mW mW/°C
Storage Temperature Range	T_{stg}	-65 to +200	°C

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Gate-Source Breakdown Voltage (I_G = -1.0 μAdc, V_{DS} = 0)	$V_{(BR)GSS}$	30	-	Vdc
Gate-Source Cutoff Voltage (I_D = 1.0 nAdc, V_{DS} = 15 Vdc)	$V_{GS(off)}$	-	6.0	Vdc
Gate-Source Voltage (I_D = 0.5 mAdc, V_{DS} = 15 Vdc)	V_{GS}	1.0	5.5	Vdc
Gate-Source Forward Voltage (I_G = 1.0 mAdc, V_{DS} = 0)	$V_{GS(f)}$	-	1.0	Vdc
Gate Reverse Current (V_{GS} = -20 Vdc, V_{DS} = 0) (V_{GS} = -20 Vdc, V_{DS} = 0, T_A = +150°C)	I_{GSS}	- -	100 200	pAdc
ON CHARACTERISTICS				
Zero-Gate Voltage Drain Current* (V_{DS} = 15 Vdc, V_{GS} = 0)	I_{DSS}*	5.0	15	mAdc

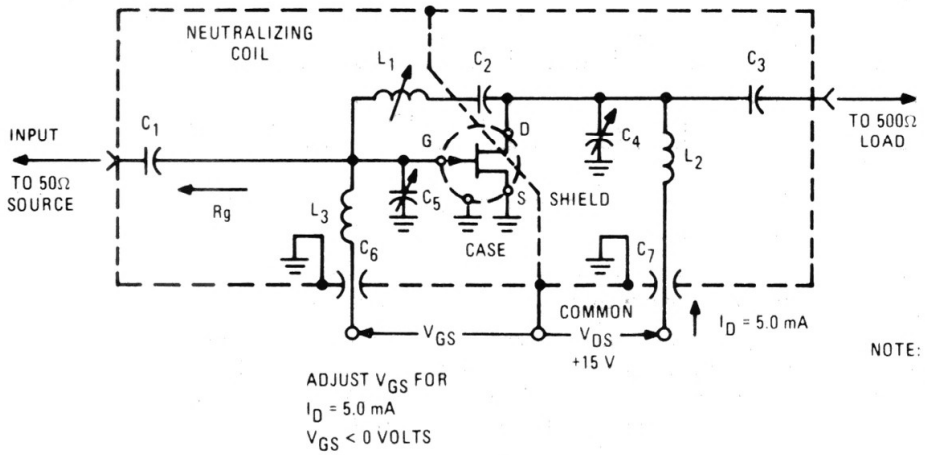
2N4416 (continued)

SMALL-SIGNAL CHARACTERISTICS

Characteristic	Symbol	Min	Max	Unit
Forward Transfer Admittance* (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	$\|y_{fs}^*\|$	4500	7500	μmhos
Real Part of Forward Transconductance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 400 MHz)	$RE(y_{fs})$	4000	-	μmhos
Real Part of Input Conductance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 400 MHz)	$RE(y_{is})$	- -	100 1000	μmhos
Output Admittance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	$\|y_{os}\|$	-	50	μmhos
Real Part of Output Conductance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 400 MHz)	$RE(y_{os})$	- -	75 100	μmhos
Imaginary Part of Input Susceptance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 400 MHz)	$IM(y_{is})$	- -	2500 10,000	μmhos
Imaginary Part of Output Susceptance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 100 MHz) (V_{DS} = 15 Vdc, V_{GS} = 0, f = 400 MHz)	$IM(y_{os})$	- -	1000 4000	μmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)	C_{iss}	-	4.0	pF
Common-Source Output Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)	C_{osp}	-	2.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)	C_{rss}	-	0.8	pF
Common-Source Spot Noise Figure (Figure 1) (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, $R_g \approx$ 1000 ohms, f = 100 MHz) (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, R_g = 1000 ohms, f = 400 MHz)	NF	- -	2.0 4.0	dB
Small-Signal Power Gain (Figure 1) (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 100 MHz) (V_{DS} = 15 Vdc, I_D = 5.0 mAdc, f = 400 MHz)	G_{ps}	18 10	- -	dB

* Pulse Test: Pulse Width = 300 μs, Duty Cycle = 1.0%.

FIGURE 1 – 100 MHz & 400 MHz NEUTRALIZED AMPLIFIER



Reference Designation	VALUE	
	100 MHZ	400 MHz
C_1	7.0 pF	1.8 pF
C_2	1000 pF	17 pF
C_3	3.0 pF	1.0 pF
C_4	1-12 pF	0.8-8.0 pF
C_5	1-12 pF	0.8-8.0 pF
C_6	0.0015 μF	0.001 μF
C_7	0.0015 μF	0.001 μF
L_1	3.0 μH*	0.2 μH**
L_2	0.15 μH*	0.03 μH**
L_3	0.14 μH*	0.022 μH**

NOTE: The noise source is a hot-cold body (AIL type 70 or equivalent) with a test receiver (AIL type 136 or equivalent).

* L_1 17 turns, (approx. – depends upon circuit layout) AWG #28 enameled copper wire, close wound on 9/32" ceramic coil form. Tuning provided by a powdered iron slug.

L_2 4 1/2 turns, AWG #18 enameled copper wire, 5/16" long, 3/8" I.D. (AIR CORE).

L_3 3 1/2 turns, AWG #18 enameled copper wire, 1/4" long, 3/8" I.D. (AIR CORE).

** L_1 6 turns, (approx. – depends upon circuit layout) AWG #24 enameled copper wire, close wound on 7/32" ceramic coil form. Tuning provided by an aluminum slug.

L_2 1 turn, AWG #16 enameled copper wire, 3/8" I.D. (AIR CORE).

L_3 1/2 turn, AWG #16 enameled copper wire, 1/4" I.D. (AIR CORE).