2N4220 thru 2N4222

2N4220,A thru 2N4222,A

CASE 20-03, STYLE 3
TO-72 (TO-206AF)

JFET
LOW-FREQUENCY, LOW NOISE

N-CHANNEL — DEPLETION

MAXIMUM RATINGS

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
Drain Current	I_D	15	mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	300 2	mW mW/°C
Junction Temperature Range	T_J	175	°C
Storage Channel Temperature Range	T_{stg}	−65 to +200	°C

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Gate-Source Breakdown Voltage (I_G = −10 μAdc, V_{DS} = 0)		$V_{(BR)GSS}$	−30	—	—	Vdc
Gate Reverse Current		I_{GSS}				nAdc
(V_{GS} = −15 Vdc, V_{DS} = 0)			—	—	−0.1	
(V_{GS} = −15 Vdc, V_{DS} = 0, T_A = 150°C)			—	—	−100	
Gate Source Cutoff Voltage		$V_{GS(off)}$				Vdc
(I_D = 0.1 nAdc, V_{DS} = 15 Vdc)	2N4220,A		—	—	−4	
	2N4221,A		—	—	−6	
	2N4222,A		—	—	−8	
Gate Source Voltage		V_{GS}				Vdc
(I_D = 50 μAdc, V_{DS} = 15 Vdc)	2N4220,A		−0.5	—	−2.5	
(I_D = 200 μAdc, V_{DS} = 15 Vdc)	2N4221,A		−1.0	—	−5.0	
(I_D = 500 μAdc, V_{DS} = 15 Vdc)	2N4222,A		−2.0	—	−6.0	
ON CHARACTERISTICS						
Zero-Gate-Voltage Drain Current*		I_{DSS}				mAdc
(V_{DS} = 15 Vdc, V_{GS} = 0)	2N4220,A		0.5	—	3.0	
	2N4221,A		2.0	—	6.0	
	2N4222,A		5.0	—	15	
Static Drain-Source On Resistance		$r_{DS(on)}$				Ohms
(V_{DS} = 0, V_{GS} = 0)	2N4220,A		—	500	—	
	2N4221,A		—	400	—	
	2N4222,A		—	300	—	
SMALL-SIGNAL CHARACTERISTICS						
Forward Transfer Admittance Common Source*		$\|y_{fs}\|$				μmhos
(V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	2N4220,A		1000	—	4000	
	2N4221,A		2000	—	5000	
	2N4222,A		2500	—	6000	
Output Admittance Common Source		$\|y_{os}\|$				μmhos
(V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 kHz)	2N4220,A		—	—	10	
	2N4221,A		—	—	20	
	2N4222,A		—	—	40	
Input Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)		C_{iss}	—	4.5	6.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 1.0 MHz)		C_{rss}	—	1.2	2.0	pF
Common-Source Output Capacitance (V_{DS} = 15 Vdc, V_{GS} = 0, f = 30 MHz)		C_{osp}	—	1.5	—	pF

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

Characteristic		Symbol	Min	Typ	Max	Unit
FUNCTIONAL CHARACTERISTICS						
Noise Figure		NF				dB
(V_{DS} = 15 Vdc, V_{GS} = 0, R_S = 1.0 megohm,	2N4220A		—	—	2.5	
f = 100 Hz)	2N4221A		—	—	2.5	
	2N4222A		—	—	2.5	

*Pulse Test: Pulse Width = 630 ms, Duty Cycle = 10%.

FIGURE 1 — NOISE FIGURE versus FREQUENCY

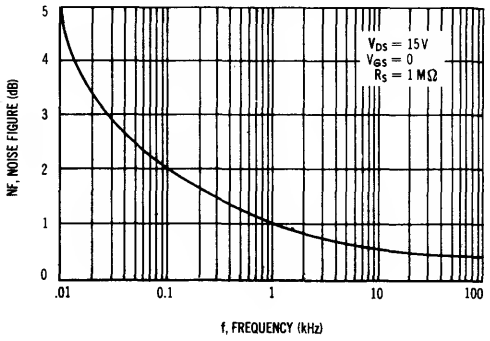

FIGURE 2 — NOISE FIGURE versus SOURCE RESISTANCE

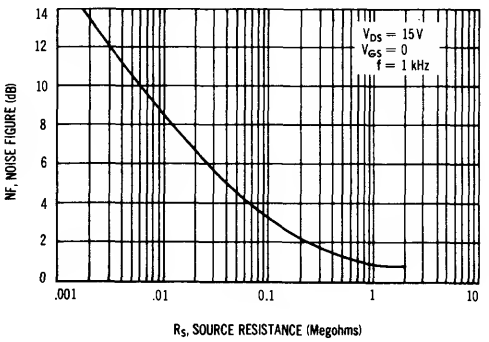

FIGURE 3 — TYPICAL DRAIN CHARACTERISTICS
$V_{GS(off)} \cong -1.2$ VOLTS

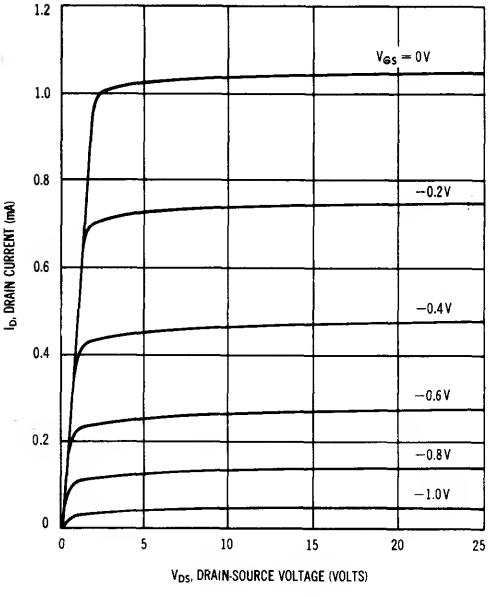

FIGURE 4 — COMMON SOURCE TRANSFER CHARACTERISTICS
$V_{GS(off)} \cong -1.2$ VOLTS

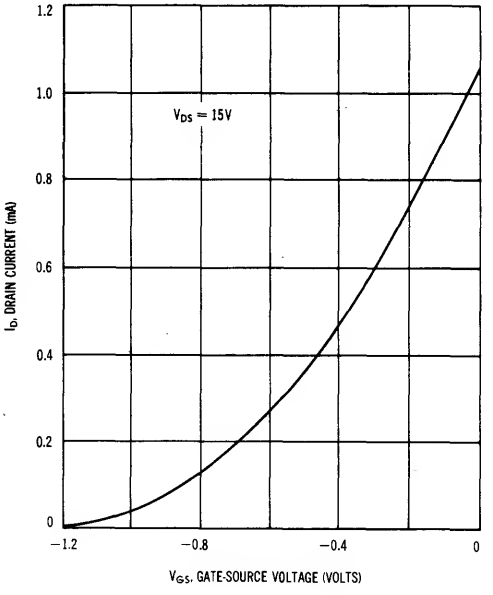

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FIGURE 5 — TYPICAL DRAIN CHARACTERISTICS
$V_{GS(off)} \cong -3.5$ VOLTS

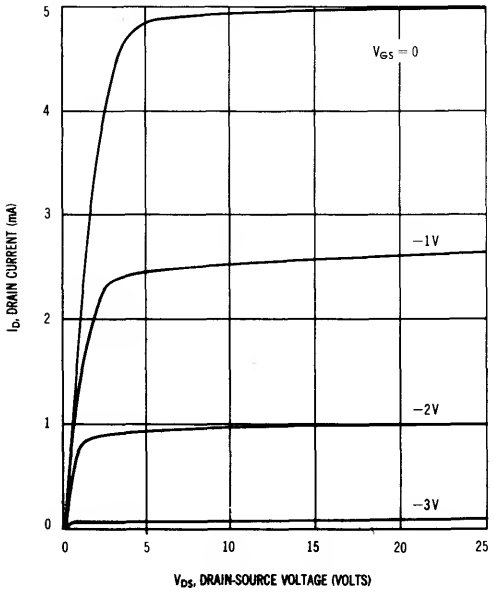


FIGURE 6 — COMMON SOURCE TRANSFER CHARACTERISTICS
$V_{GS(off)} \cong -3.5$ VOLTS

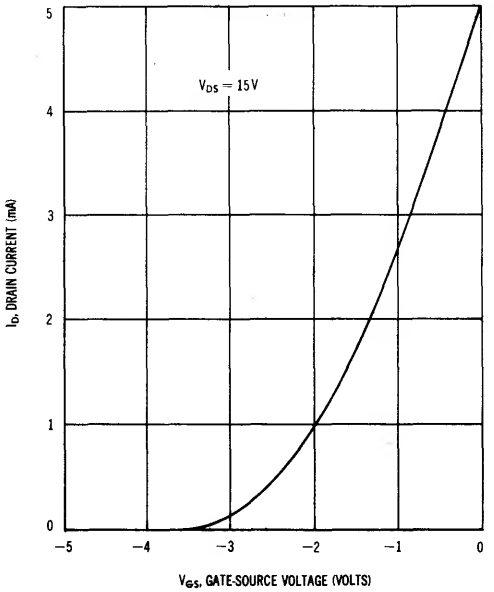


FIGURE 7 — TYPICAL DRAIN CHARACTERISTICS
$V_{GS(off)} \cong -5.8$ VOLTS

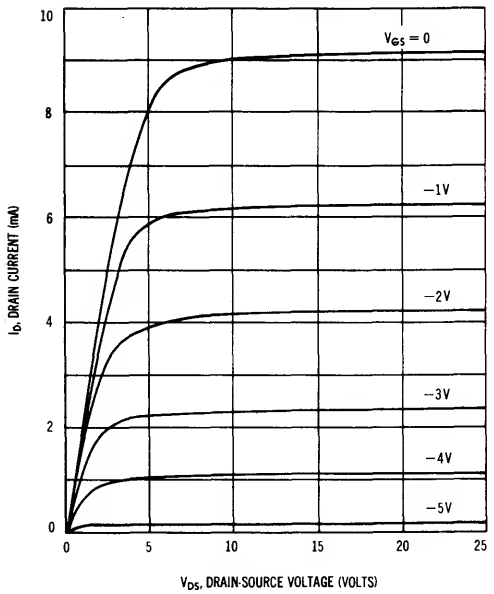
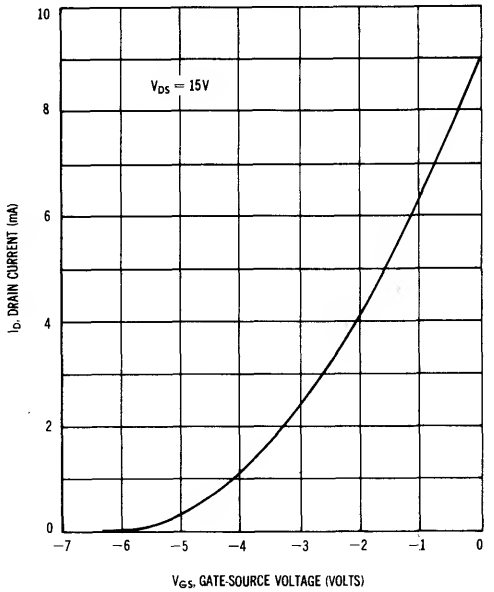


FIGURE 8 — COMMON SOURCE TRANSFER CHARACTERISTICS
$V_{GS(off)} \cong -5.8$ VOLTS



NOTES:

1. Graphical data is presented for dc conditions. Tabular data is given for pulsed conditions (Pulse Width = 630 ms, Duty Cycle = 10%). Under dc conditions, self heating in higher I_{DSS} units reduces I_{DSS} (See Figure 10).
2. Figures 8, 9, 10: Data taken in a standard printed circuit with a TO-18 type socket mounting and 1/4" lead length.