DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MFE120-MFE122

DUAL GATE MOSFETS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS.

Rating	Symbol	Value	Unit
Drain Source Voltage	V_{DS}	25	Vdc
Drain Current	I_D	30	mAdc
Total Power Dissipation @ T_A = 25°C **Derate above 25°C**	P_D	300 1.7	mW mW/°C
Operating and Storage Temperature Range	T_J, T_{stg}	-65 to +175	°C

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

Characteristics		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain Source Breakdown Voltage (I_D = 100 µAdc, V_S = 0, V_{G1S} = -4.0 Vdc, V_{G2S} = 4.0V)		$V_{(BR)DSX}$	25	-	-	Vdc
Gate 1 – Source Breakdown Voltage (1) (I_{G1} = ±10 µAdc, V_{G2S} = 0)		$V_{(BR)G1SO}$	±7.0	-	±20	Vdc
Gate 2 – Source Breakdown Voltage (1) (I_{G2} = ±10 µAdc, V_{G2S} = 0)		$V_{(BR)G2SO}$	±7.0	-	±20	Vdc
Gate 1 Leakage Current (V_{G1S} = ±6.0 Vdc, V_{G2S} = 0, V_{DS} = 0)		I_{G1SS}	-	-	20	nAdc
Gate 2 Leakage Current (V_{G2S} = ±6.0 Vdc, V_{G1S} = 0, V_{DS} = 0)		I_{G2SS}	-	-	20	nAdc
Gate 1 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 200 µAdc)		$V_{G1S(off)}$	-	-	-4.0	Vdc
Gate 2 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G1S} = 0, I_D = 200 µAdc)		$V_{G2S(off)}$	-	-	-4.0	Vdc
ON CHARACTERISTICS						
Zero-Gate Voltage Drain Current (V_{DS} = 15 Vdc, V_{G1S} = 0, V_{G2S} = 4.0 Vdc)	MFE120 MFE121 MFE122	I_{DSS}	2.0 5.0 2.0	7.0 10 9.0	18 30 20	mAdc
SMALL SIGNAL CHARACTERISTICS						
Forward Transfer Admittance (Gate 1 to Drain) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 10mAdc, f = 1.0 kHz)	MFE120, MFE122 MFE121	$\lvert Y_{fs} \rvert$	8000 10000	- -	18000 20000	µmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	MFE120, MFE122 MFE121	C_{iss}	- -	4.5 4.5	7.0 6.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc, f = 1.0 MHz)		C_{rss}	-	0.023	-	pF
Output Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	MFE120, MFE122 MFE121	C_{oss}	- -	2.5 2.5	4.0 3.5	pF

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FUNCTIONAL CHARACTERISTICS						
Noise Figure (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0mAdc, Z_S is optimized for NF) (f = 105MHz, Figure 1) (f = 60MHz, figure 3) (f = 200MHz, figure 3)	 MFE120 MFE121 MFE121	NF	 - - -	 2.9 2.6 2.6	 5.0 5.0 5.0	dB
OFF CHARACTERISTICS						
Drain Source Breakdown Voltage (I_D = 100 µAdc, V_S = 0, V_{G1S} = -4.0 Vdc, V_{G2S} = 4.0V)		$V_{(BR)DSX}$	25	-	-	Vdc
Gate 1 – Source Breakdown Voltage [1] (I_{G1} = ±10 µAdc, V_{G2S} = 0)		$V_{(BR)G1SO}$	±7.0	-	±20	Vdc
Gate 2 – Source Breakdown Voltage [1] (I_{G2} = ±10 µAdc, V_{G2S} = 0)		$V_{(BR)G2SO}$	±7.0	-	±20	Vdc
Gate 1 Leakage Current (V_{G1S} = ±6.0 Vdc, V_{G2S} = 0, V_{DS} = 0)		I_{G1SS}	-	-	20	nAdc
Gate 2 Leakage Current (V_{G2S} = ±6.0 Vdc, V_{G1S} = 0, V_{DS} = 0)		I_{G2SS}	-	-	20	nAdc
Gate 1 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 200 µAdc)		$V_{G1S(off)}$	-	-	-4.0	Vdc
Gate 2 to Source Cutoff Voltage (V_{DS} = 15 Vdc, V_{G1S} = 0, I_D = 200 µAdc)		$V_{G2S(off)}$	-	-	-4.0	Vdc
ON CHARACTERISTICS						
Zero-Gate Voltage Drain Current (V_{DS} = 15 Vdc, V_{G1S} = 0, V_{G2S} = 4.0 Vdc)	 MFE120 MFE121 MFE122	I_{DSS}	 2.0 5.0 2.0	 7.0 10 9.0	 18 30 20	mAdc
SMALL SIGNAL CHARACTERISTICS						
Forward Transfer Admittance (Gate 1 to Drain) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 10mAdc, f = 1.0 kHz)	 MFE120, MFE122 MFE121	$\lvert Y_{fs} \rvert$	 8000 10000	 - -	 18000 20000	µmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	 MFE120, MFE122 MFE121	C_{iss}	 - -	 4.5 4.5	 7.0 6.0	pF
Reverse Transfer Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc, f = 1.0 MHz)		C_{rss}	-	0.023	-	pF
Output Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	 MFE120, MFE122 MFE121	C_{oss}	 - -	 2.5 2.5	 4.0 3.5	pF
FUNCTIONAL CHARACTERISTICS						
Noise Figure (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0mAdc, Z_S is optimized for NF) (f = 105MHz, Figure 1) (f = 60MHz, figure 3) (f = 200MHz, figure 3)	 MFE120 MFE121 MFE121	NF	 - - -	 2.9 2.6 2.6	 5.0 5.0 5.0	dB

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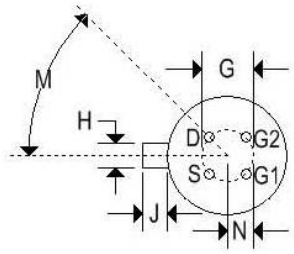
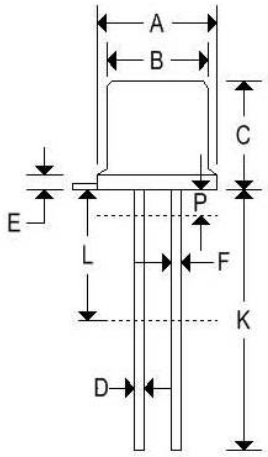
MECHANICAL CHARACTERISTICS

Case:	TO-72
Marking:	Alpha-numeric
Pin out:	See below





	TO-72			
	Inches		Millimeters	
	Min	Max	Min	Max
A	-	0.230	-	5.840
B	-	0.195	-	4.950
C	-	0.210	-	5.330
D	-	0.021	-	0.530
E	-	0.030	-	0.760
F	-	0.019	-	0.480
G	0.100 BSC		2.540 BSC	
H	-	0.046	-	1.170
J	-	0.048	-	1.220
K	0.500	-	12.700	-
L	0.250	-	-	6.350
M	45° BSC		45° BSC	
N	0.050 BDC		1.270 BSC	
P	-	0.050	-	1.270

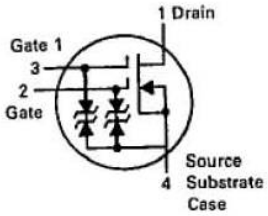


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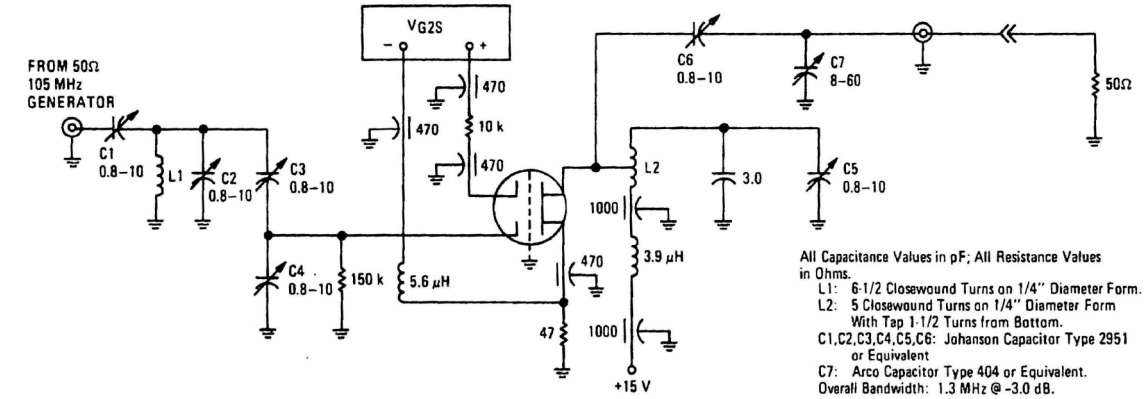
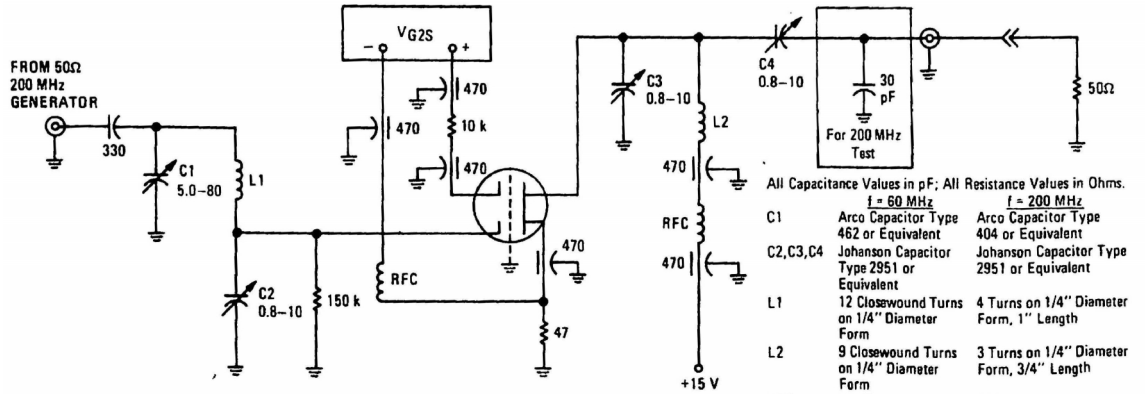
FIGURE 1 – 105 MHz TEST CIRCUIT



All Capacitance Values in pF; All Resistance Values in Ohms.
L1: 6-1/2 Closewound Turns on 1/4" Diameter Form.
L2: 5 Closewound Turns on 1/4" Diameter Form With Tap 1-1/2 Turns from Bottom.
C1,C2,C3,C4,C5,C6: Johanson Capacitor Type 2951 or Equivalent
C7: Arco Capacitor Type 404 or Equivalent.
Overall Bandwidth: 1.3 MHz @ -3.0 dB.

FIGURE 2 – 60 AND 200 MHz TEST CIRCUIT



All Capacitance Values in pF; All Resistance Values in Ohms.

	f = 60 MHz	f = 200 MHz
C1	Arco Capacitor Type 462 or Equivalent	Arco Capacitor Type 404 or Equivalent
C2,C3,C4	Johanson Capacitor Type 2951 or Equivalent	Johanson Capacitor Type 2951 or Equivalent
L1	12 Closewound Turns on 1/4" Diameter Form	4 Turns on 1/4" Diameter Form, 1" Length
L2	9 Closewound Turns on 1/4" Diameter Form	3 Turns on 1/4" Diameter Form, 3/4" Length
RFC	10 μH	1.0 μH
Overall Bandwidth	6.0 MHz @ -3.0 dB	8.5 MHz @ -3.0 dB

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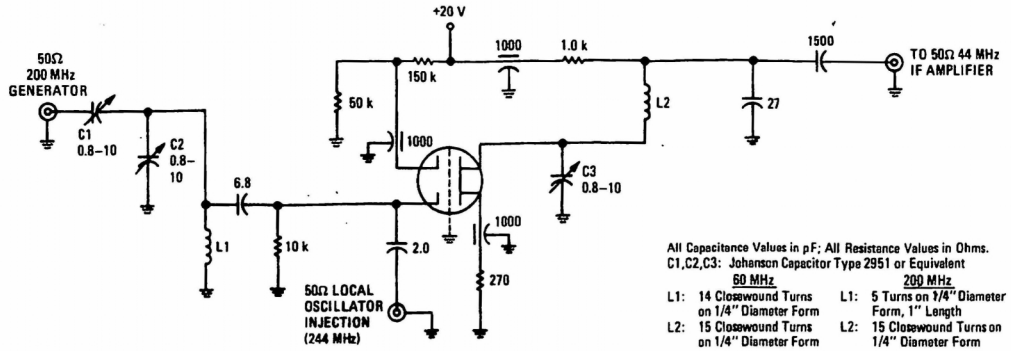
FIGURE 3 – 60 AND 200 MHz CONVERSION POWER GAIN



COMMON-SOURCE ADMITTANCE PARAMETERS
(V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc)

FIGURE 4 – INPUT ADMITTANCE

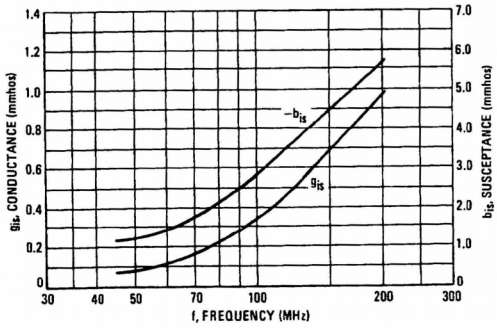


FIGURE 5 – REVERSE TRANSFER ADMITTANCE

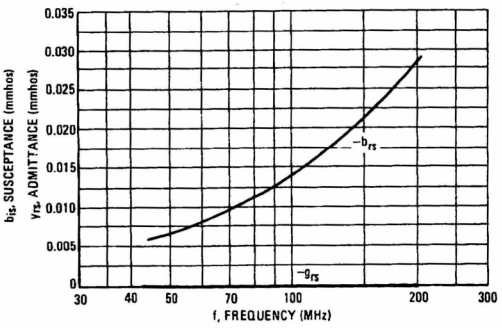


FIGURE 6 – FORWARD TRANSFER ADMITTANCE

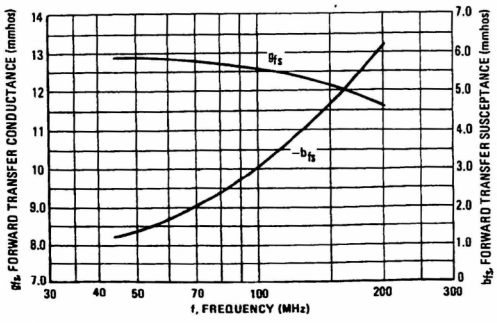


FIGURE 7 – OUTPUT ADMITTANCE

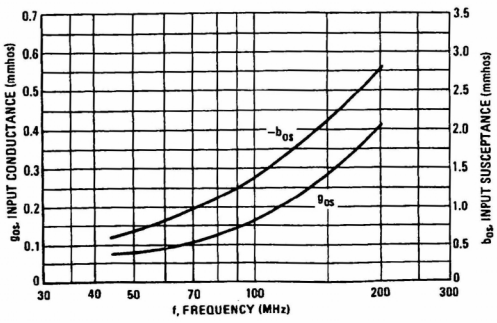


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FIGURE 8 – GAIN REDUCTION

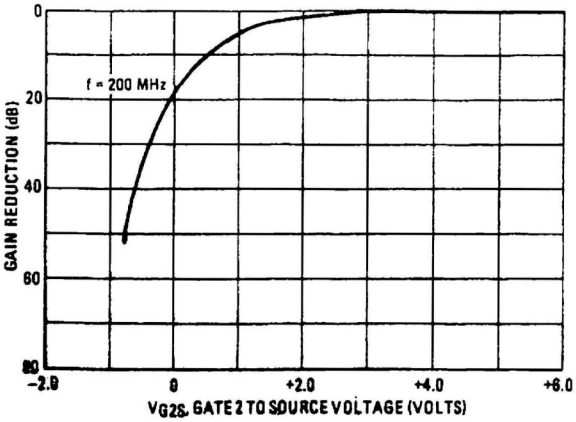

FIGURE 9 – CONVERSION POWER GAIN