MPF130, MPF131, MPF132 (SILICON)
MFE130, MFE131, MFE132

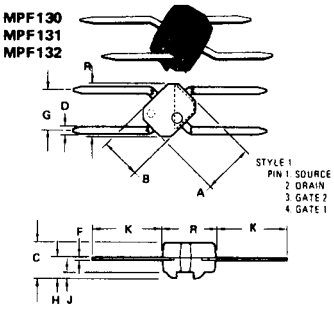
N-CHANNEL
DUAL GATE
MOS FIELD – EFFECT
TRANSISTORS

N-CHANNEL DUAL-GATE
SILICON-NITRIDE PASSIVATED
MOS FIELD-EFFECT TRANSISTORS

. . . depletion mode (Type B) dual gate transistors designed for VHF amplifier and mixer applications. These types are specified as follows:

- MPF130/MFE130 – RF Amplifier @ 105 MHz
  MPF131/MFE131 – RF Amplifier @ 60 and 200 MHz
  MPF132/MFE132 – Mixer @ 60 and 200 MHz
- Silicon Nitride Passivation for Excellent Long Term Stability
- Diode Protected Gates
- Supplied in Metal Can or Plastic Packages –
  MFE130 Series – TO-72
  MPF130 Series – Case 262

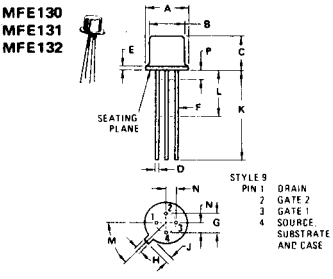
MPF130
MPF131
MPF132



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	4.95	5.21	0.195	0.205
B	3.94	4.19	0.155	0.165
C	2.67	2.92	0.105	0.115
D	0.64	0.89	0.025	0.035
F	0.20	0.30	0.008	0.012
G	4.06 BSC		0.160 BSC	
H	1.57	1.83	0.062	0.072
J	0.51	0.76	0.020	0.030
K	6.35	7.62	0.250	0.300
R	5.21	5.46	0.205	0.215

CASE 262-02

MFE130
MFE131
MFE132



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	–	0.76	–	0.030
F	0.41	0.48	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	–	1.27	–	0.050

CASE 20-03
TO-72

MAXIMUM RATINGS

Rating	Symbol	Value		Unit
Drain-Source Voltage	V_{DS}	25		Vdc
Drain Current	I_D	30		mAdc
		MPF130 Series	MFE130 Series	
Total Power Dissipation @ $T_A = 25^oC$ (Package Limitation)	P_D	350	300	mW
Derate above 25^oC		2.33	1.71	$mW/^oC$
Operating and Storage Channel Temperature Range	$T_{channel}$, T_{stg}	-65 to +175	-65 to +200	^oC

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) Substrate Connected to Source

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage (I_D = 10 μAdc, V_S = 0, V_{G1} = -4.0 Vdc, V_{G2} = +4.0 Vdc)	$V_{(BR)DSX}$	25	–	–	Vdc
Gate 1 – Source Breakdown Voltage (I_{G1} = ±10 μAdc, V_{G2S} = 0)	$V_{(BR)G1SO}$	±7.0	–	±20	Vdc
Gate 2 – Source Breakdown Voltage (I_{G2} = ±10 μAdc, V_{G2S} = 0)	$V_{(BR)G2SO}$	±7.0	–	±20	Vdc
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
Gate 1 Reverse Leakage Current (V_{G1S} = ±6.0 Vdc, V_{G2S} = 0, V_{DS} = 0)	I_{G1SS}	–	–	20	nAdc
Gate 2 Reverse Leakage Current (V_{G2S} = ±6.0 Vdc, V_{G1S} = 0, V_{DS} = 0)	I_{G2SS}	–	–	20	nAdc
ON CHARACTERISTICS					
Zero-Gate Voltage Drain Current (V_{DS} = 15 Vdc, V_{G1S} = 0, V_{G2S} = 4.0 Vdc)	I_{DSS}	3.0	10	30	mAdc
SMALL-SIGNAL CHARACTERISTICS					
Forward Transfer Admittance (Gate 1 connected to Drain) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 10 mAdc, f = 1.0 kHz)	Y_{fs}	8000	–	20,000	μmhos
Input Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	C_{iss}	–	4.5	7.0	pF
Output Capacitance (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = I_{DSS}, f = 1.0 MHz)	C_{oss}	–	2.5	4.0	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	0.05	pF
Common-Source Noise Figure (Figure 7) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc, Z_S is optimized for NF)	NF				dB
(f = 105 MHz) MPF/MFE130		–	2.9	5.0	
(f = 60 MHz) MPF/MFE131		–	2.5	5.0	
(f = 200 MHz) MPF/MFE131		–	3.0	5.0	
Common-Source Power Gain (Figure 7) (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc, Z_S is optimized for NF)	G_{ps}				dB
(f = 105 MHz) MPF/MFE130		17	23	–	
(f = 60 MHz) MPF/MFE131		20	27	–	
(f = 200 MHz) MPF/MFE131		17	20	–	
Level of Unwanted Signal for 1.0% Cross Modulation (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc)	–	–	100	–	mV
Common-Source Conversion Power Gain (Gate 1 Injection, Figure 8). (V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, Local Oscillator Voltage = 925 mVrms)	G_c				dB
(Signal Frequency = 60 MHz, Local Oscillator Frequency = 104 MHz) MPF/MFE132		15	16.5	–	
(Signal Frequency = 200 MHz, Local Oscillator Frequency = 244 MHz) MPF/MFE132		12	14	–	

COMMON-SOURCE ADMITTANCE PARAMETERS

(V_{DS} = 15 Vdc, V_{G2S} = 4.0 Vdc, I_D = 6.0 mAdc)

FIGURE 1 – INPUT ADMITTANCE

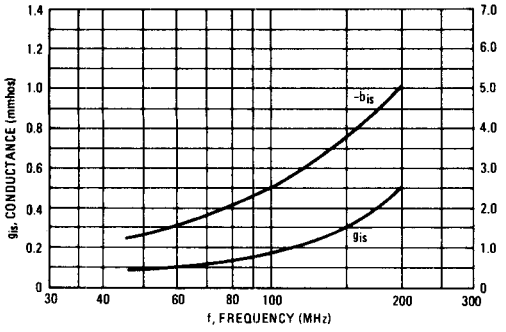


FIGURE 2 – REVERSE TRANSFER ADMITTANCE

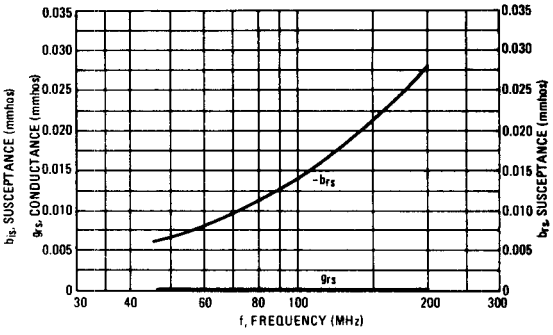


FIGURE 3 – FORWARD TRANSFER ADMITTANCE

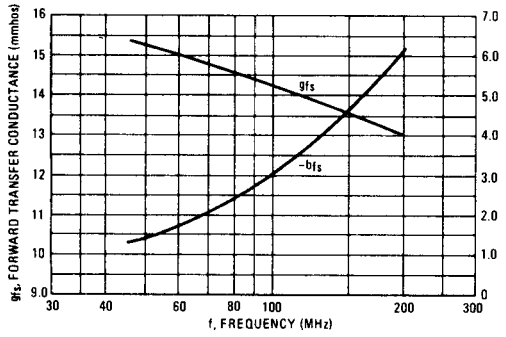


FIGURE 4 – OUTPUT ADMITTANCE

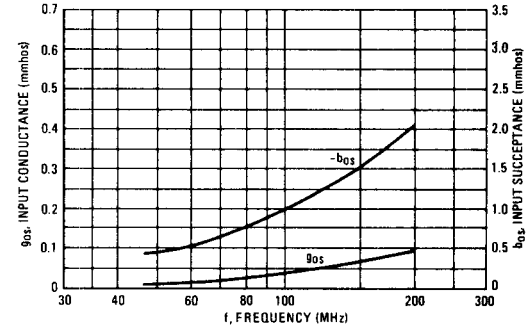


FIGURE 5 – GAIN REDUCTION

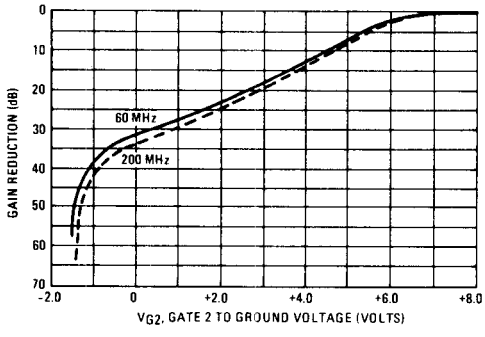


FIGURE 6 – CONVERSION POWER GAIN

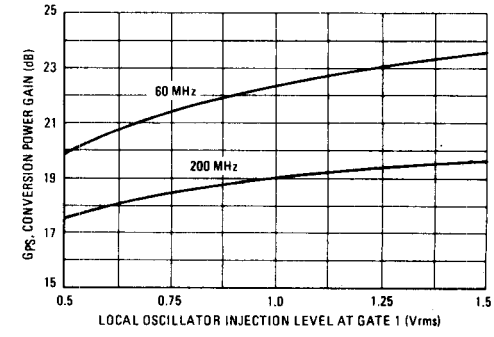
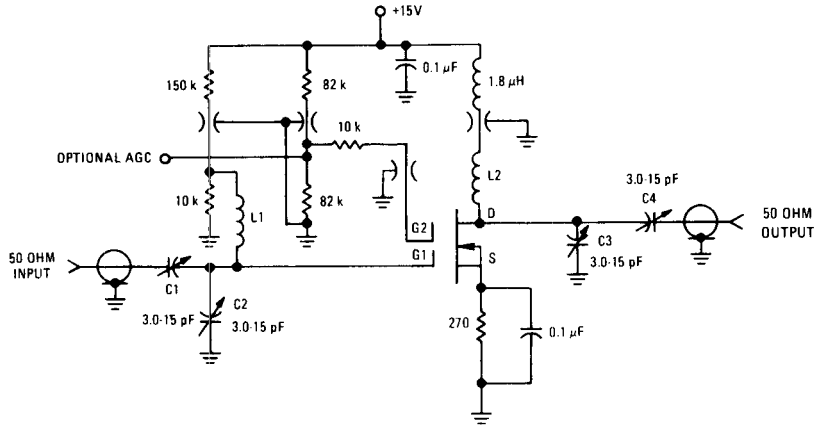


FIGURE 7 – 60, 105 AND 200 MHz POWER GAIN AND NOISE FIGURE TEST CIRCUIT

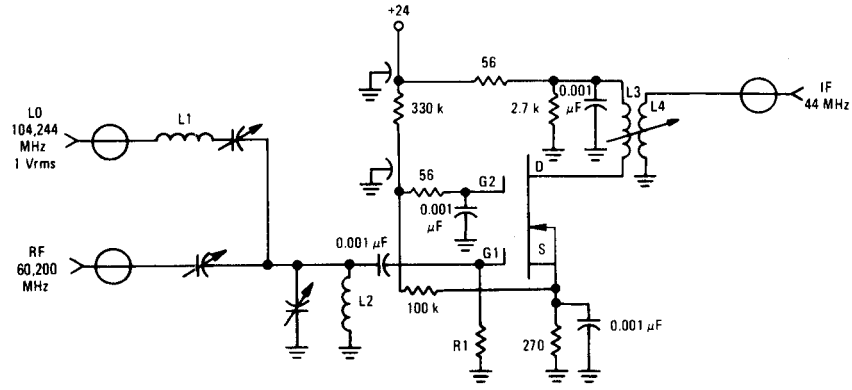


	L1	L2
60 MHz	0.33 μH	0.47 μH
105 MHz	#16 AWG, 6 1/2 Turns, 1" Long, 1/4" Dia.	#16 AWG, 5 1/4 Turns, 1" Long, 7/16" Dia.
200 MHz	#16 AWG, 3 1/2 Turns, 0.7" Long, 0.2" Dia.	#16 AWG, 4 1/2 Turns, 0.65" Long, 0.2" Dia.

All Feedthrough Capacitors 1000 pF

All Variable Capacitors JOHANSON JMC2951, 3.0-15 pF

FIGURE 8 – 60 AND 200 MHz CONVERSION GAIN TEST CIRCUIT



	R1	L1	L2	L3	L4
60 MHz	10 k	10 Turns #22 Enameled on MILLER 4500-4 Core	0.33 μH DELEVAN	15 Turns #26 Enameled on MILLER 4500-1 Core	4 Turns #26 Enameled on Same Core as L3
200 MHz	1.0 k	3 1/2 Turns #18, 1/4" Dia., 1/2" Long	2 1/2 Turns #18, 3/8" Dia., 1/2" Long	15 Turns #26 Enameled on MILLER 4500-1 Core	4 Turns #26 Enameled on Same Core as L3

All Feedthrough Capacitors 1000 pF.

All Variable Capacitors JOHANSON JMC2951, 3.0-15 pF