DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MFE140

DUAL GATE MOSFET

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
Gate-source voltage	V_{GS}	±7.0	Vdc
Drain current	I_D	30	mAdc
Gate current	I_G	10	mAdc
Total device dissipation @ T_A = 25°C **Derate above 25°C**	P_D	300	mW
Operating and storage temperature range	T_J, T_{stg}	-65 to 175	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain source breakdown voltage (I_D = 10µAdc, V_S = 0, V_{G1} = -4.0Vdc, V_{G2} = 4.0Vdc)	$V_{(BR)DSX}$	25	-	-	Vdc
Gate 1-source breakdown voltage (I_{G1} = ±10µAdc, V_{G2S} = 0)	$V_{(BR)G1SO}$	±7.0	-	±20	Vdc
Gate 2-source breakdown voltage (I_{G2} = ±10µAdc, V_{G2S} = 0)	$V_{(BR)G2SO}$	±7.0	-	±20	Vdc
Gate 1 leakage current (V_{G1S} = ±6.0Vdc, V_{G2S} = 0, V_{DS} = 0)	I_{G1SS}	-	-	20	nAdc
Gate 2 leakage current (V_{G2S} = ±6.0Vdc, V_{G1S} = 0, V_{DS} = 0)	I_{G2SS}	-	-	20	nAdc
Gate 1 to source cutoff voltage (V_{DS} = 15Vdc, V_{G2S} = 4.0, I_D = 200µAdc)	$V_{G1S(off)}$	-	-	-4.0	Vdc
Gate 2 to source cutoff voltage (V_{DS} = 15Vdc, V_{G1S} = 0, I_D = 200µAdc)	$V_{G2S(off)}$	-	-	-4.0	Vdc
ON CHARACTERISTICS					
Zero-gate voltage drain current (V_{DS} = 15Vdc, V_{G2S} = 0, V_{G2S} = 4.0Vdc)	I_{DSS}	3.0	10	30	mA
SMALL SIGNAL CHARACTERISTICS					
Forward transfer admittance (gate 1 connected to drain) (V_{DS} = 15Vdc, V_{G2S} = 4.0Vdc, I_D = 10mAdc, f = 1.0kHz)	$\lvert y_{fs} \rvert$	10	-	20	mmhs
Input capacitance (V_{DS} = 15Vdc, V_{G2S} = 4.0Vdc, I_D = I_{DSS}, f = 1.0MHz)	Ciss	-	4.5	7.0	pF
Reverse transfer capacitance (V_{DS} = 15Vdc, V_{G2S} = 4.0Vdc, I_D = I_{DSS}, f = 1.0MHz)	Crss	-	0.023	0.05	pF
Output capacitance (V_{DS} = 15Vdc, V_{G2S} = 4.0Vdc, I_D = I_{DSS}, f = 1.0MHz)	Coss	-	2.5	4.0	pF

DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

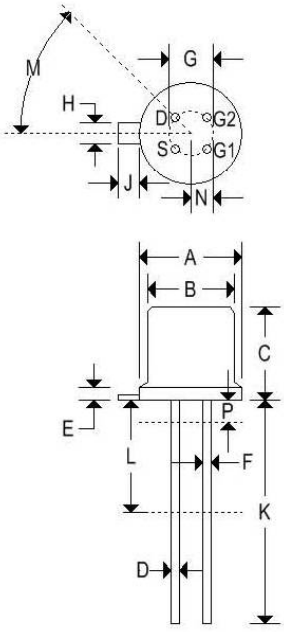
MFE140

DUAL GATE MOSFET

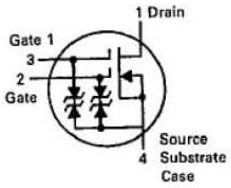
FUNCTIONAL CHARACTERISTICS					
Noise figure	NF	-	2.5	3.5	dB
Common source power gain	G_{ps}	20	23	-	dB
Level of unwanted signal for 1.0% cross modulation	-	-	45	-	mV
Common-source conversion power gain(Gate 1 or Gate 2 injection) (Signal frequency = 100MHz, local oscillator frequency = 110.7MHz)	G_C	15	18.5	-	dB
½ IF rejection	½ I_{FREJ}	-	50	-	dB

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



DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MFE140

DUAL GATE MOSFET

FIGURE 1 – INPUT ADMITTANCE

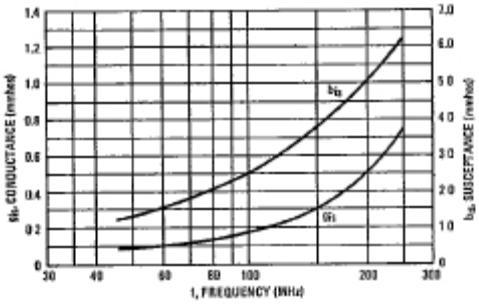


FIGURE 2 – REVERSE TRANSFER ADMITTANCE

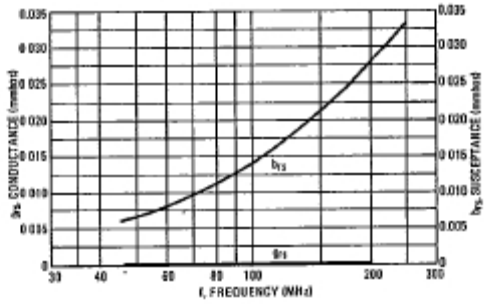


FIGURE 3 – FORWARD TRANSFER ADMITTANCE

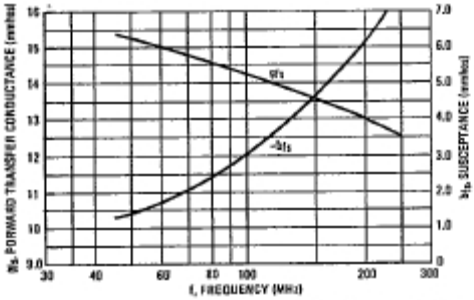
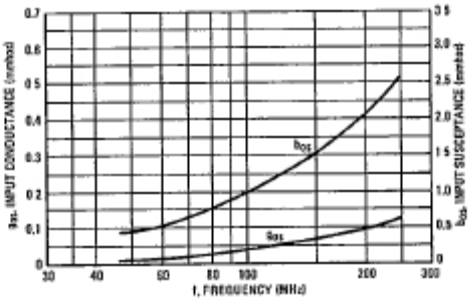


FIGURE 4 – OUTPUT ADMITTANCE



FORWARD TRANSFER ADMITTANCE
(V_{DS} = 15 Vdc, f = 1.0 kHz)

FIGURE 5 – GATE 1

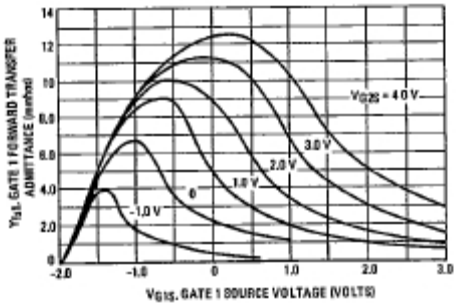
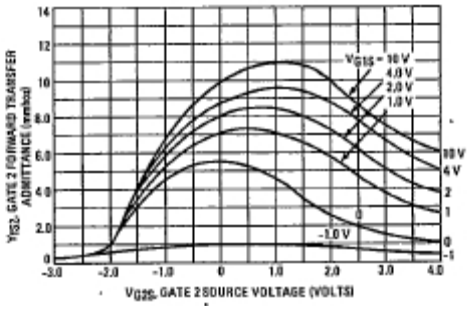


FIGURE 6 – GATE 2



DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MFE140

DUAL GATE MOSFET

FIGURE 7 – POWER GAIN

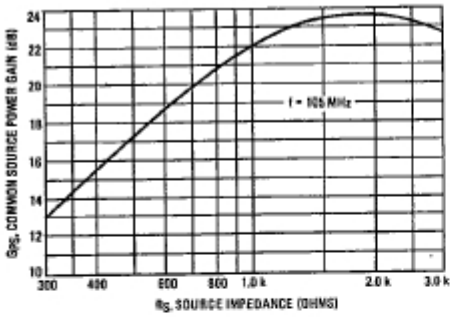


FIGURE 8 – NOISE FIGURE

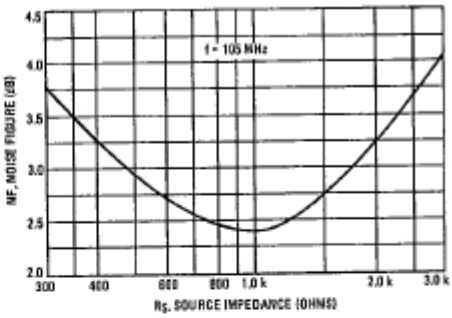


FIGURE 9 – GAIN REDUCTION

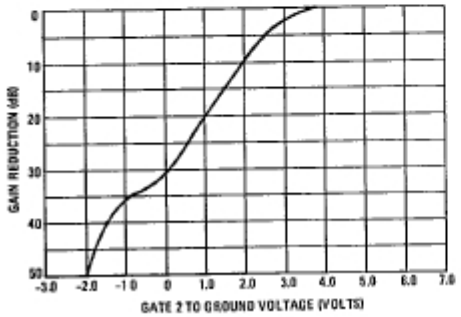


FIGURE 10 – CROSS MODULATION

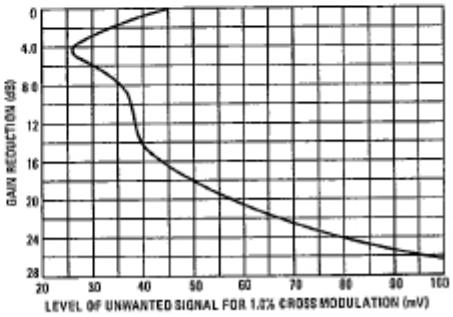
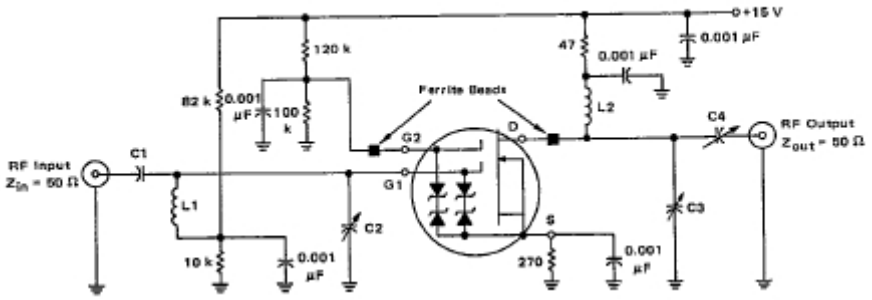


FIGURE 11 – 105 MHz POWER GAIN AND NOISE FIGURE TEST CIRCUIT



DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MFE140

DUAL GATE MOSFET

FIGURE 12 – CONVERSION GAIN

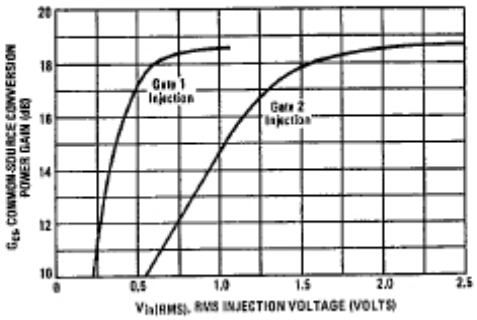


FIGURE 13 – CONVERSION GAIN TEST CIRCUIT