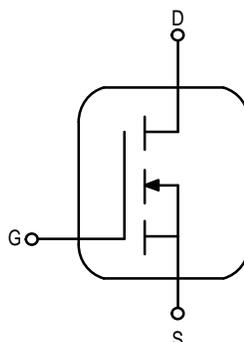


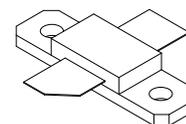
The RF MOSFET Line  
**RF Power**  
**Field Effect Transistors**  
N-Channel Enhancement-Mode Lateral  
MOSFETs

- High Gain, Rugged Device
- Broadband Performance from HF to 1 GHz
- Bottom Side Source Eliminates DC Isolators, Reducing Common Mode Inductances

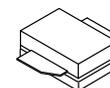


**MRF182**  
**MRF182S**

**30 WATTS, 1.0 GHz,**  
**28 VOLTS**  
**LATERAL N-CHANNEL**  
**BROADBAND RF**  
**POWER MOSFET**



CASE 360B-01, STYLE 1



CASE 360C-02, STYLE 1

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	$V_{DSS}$	65	Vdc
Gate-Source Voltage	$V_{GS}$	$\pm 20$	Vdc
Storage Temperature Range	$T_{stg}$	-65 to +150	$^{\circ}C$
Operating Junction Temperature	$T_J$	200	$^{\circ}C$
Total Device Dissipation @ $T_C = 25^{\circ}C$ Derate above $25^{\circ}C$	$P_D$	117 0.67	W W/ $^{\circ}C$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.5	$^{\circ}C/W$

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^{\circ}C$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Drain-Source Breakdown Voltage ( $V_{GS} = 0, I_D = 50 \mu A$ )	$V_{(BR)DSS}$	65	-	-	Vdc
Zero Gate Voltage Drain Current ( $V_{DS} = 28 V, V_{GS} = 0$ )	$I_{DSS}$	-	-	1	mAdc
Gate-Source Leakage Current ( $V_{GS} = 20 V, V_{DS} = 0$ )	$I_{GSS}$	-	-	1	$\mu A$ dc

NOTE - **CAUTION** - MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

**ELECTRICAL CHARACTERISTICS – continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

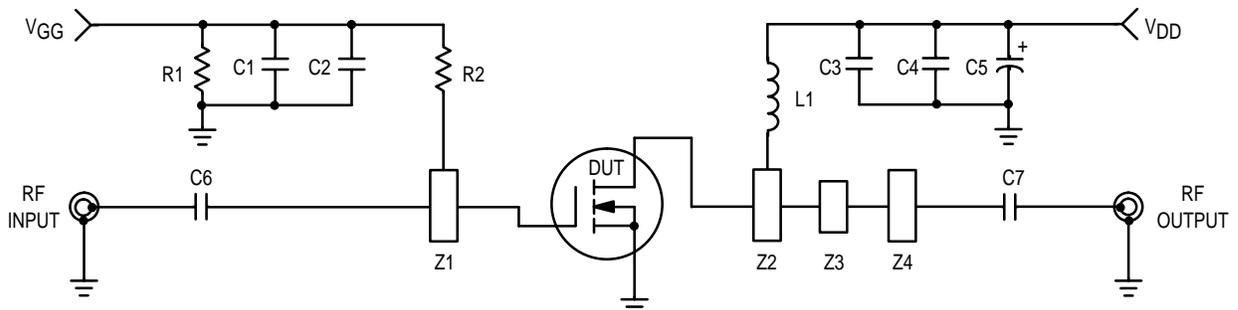
Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
Gate Threshold Voltage ( $V_{DS} = 10\text{ V}$ , $I_D = 50\text{ mA}$ )	$V_{GS(th)}$	1	3	5	Vdc
Drain–Source On–Voltage ( $V_{GS} = 10\text{ V}$ , $I_D = 1\text{ A}$ )	$V_{DS(on)}$	–	0.34	–	Vdc
Forward Transconductance ( $V_{DS} = 10\text{ V}$ , $I_D = 3\text{ A}$ )	$g_{fs}$	1.6	1.8	–	S

**DYNAMIC CHARACTERISTICS**

Input Capacitance ( $V_{DS} = 28\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{iss}$	–	56	–	pF
Output Capacitance ( $V_{DS} = 28\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{oss}$	–	28	–	pF
Reverse Transfer Capacitance ( $V_{DS} = 28\text{ V}$ , $V_{GS} = 0$ , $f = 1\text{ MHz}$ )	$C_{rss}$	–	2.5	–	pF

**FUNCTIONAL CHARACTERISTICS**

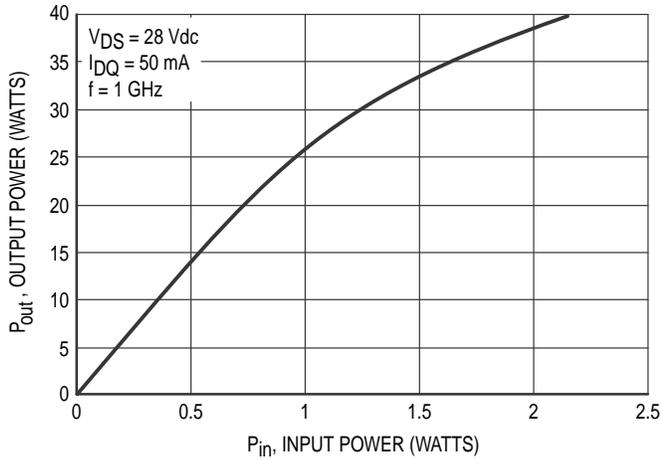
Common Source Power Gain ( $V_{DD} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$G_{ps}$	11	13	–	dB
Drain Efficiency ( $V_{DD} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$\eta$	45	55	–	%
Series Equivalent Input Impedance ( $V_{DD} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$Z_{in}$	–	$0.81 + j1.6$	–	ohms
Series Equivalent Output Impedance ( $V_{DD} = 28\text{ Vdc}$ , $P_{out} = 30\text{ W}$ , $I_{DQ} = 50\text{ mA}$ , $f = 960\text{ MHz}$ )	$Z_{out}$	–	$2.15 - j1.7$	–	ohms



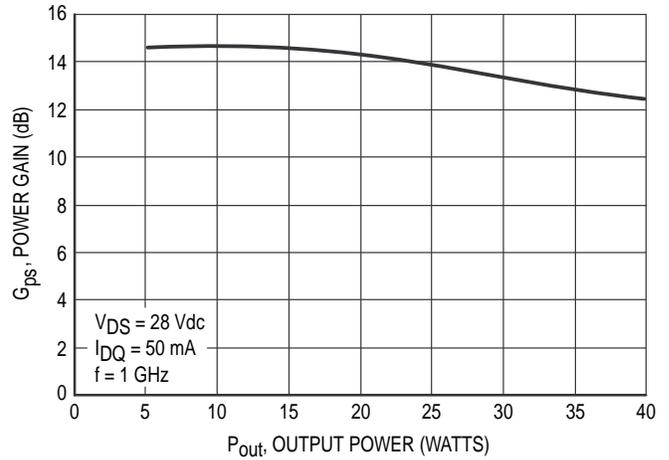
- C1, C3 — 0.1  $\mu\text{F}$  Ceramic Capacitor
- C2, C4 — 240 pF 0.1" Chip Capacitor
- C5 — 150  $\mu\text{F}$ , 50 V Electrolytic Capacitor
- C6, C7 — 220 pF 0.1" Chip Capacitor
- L1–3T, #18 AWG 1/8" ID 0.285" Long
- R1 — 1 K $\Omega$ , 1/4 W
- R2 — 10 K $\Omega$ , 1/4 W
- Z1–Z4 — Microstrip

**Figure 1. Test Circuit Schematic**

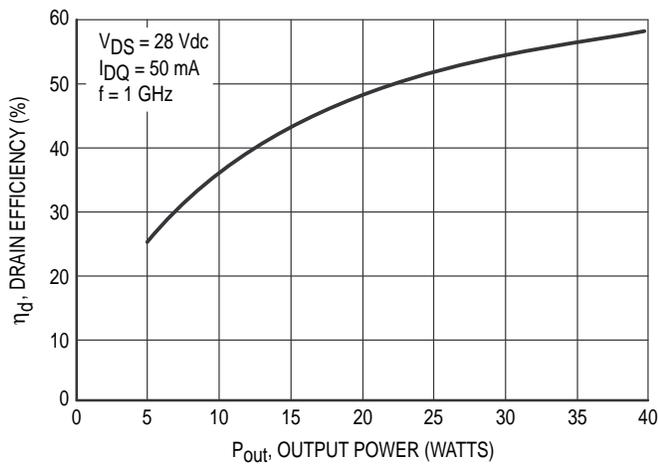
## TYPICAL CHARACTERISTICS



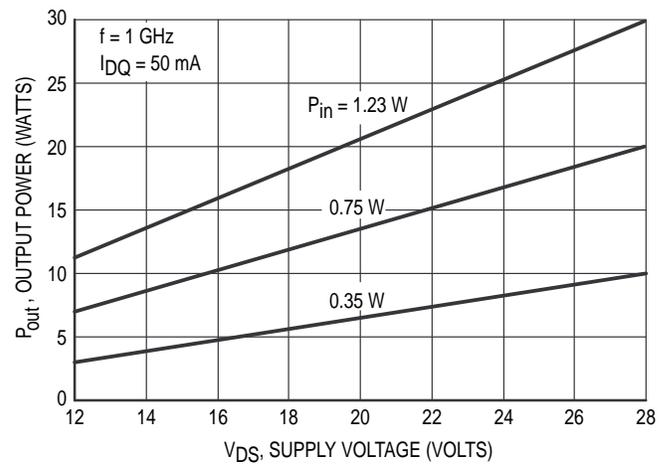
**Figure 2. Output Power versus Input Power at 1 GHz**



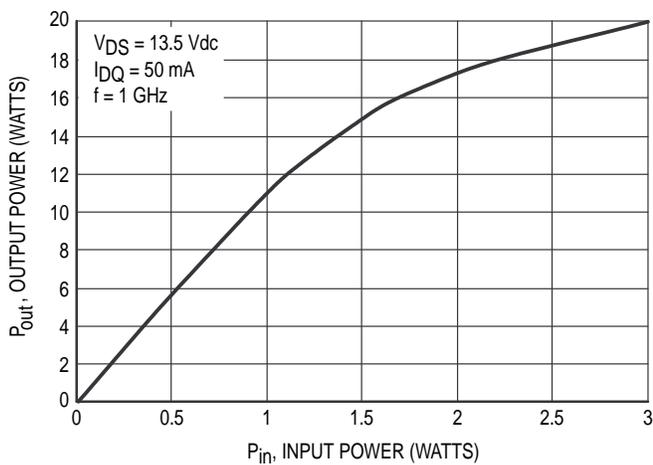
**Figure 3. Power Gain versus Output Power at 1 GHz**



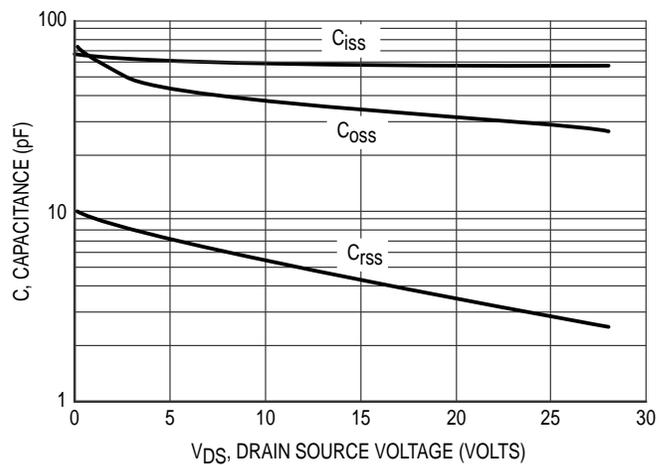
**Figure 4. Drain Efficiency versus Output Power at 1 GHz**



**Figure 5. Output Power versus Supply Voltage**



**Figure 6. Output Power versus Input Power**



**Figure 7. Capacitance versus Drain Source Voltage**

Table 1. Typical Common Source S-Parameters ( $V_{DS} = 13.5\text{ V}$ )

$I_D = 1.0\text{ A}$

f MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	∠φ	S <sub>21</sub>	∠φ	S <sub>12</sub>	∠φ	S <sub>22</sub>	∠φ
20	0.933	-131.2	40.806	111.9	0.0207	22.6	0.664	-138.4
30	0.922	-147.7	29.305	104.0	0.0222	15.0	0.700	-150.5
40	0.892	-155.8	22.187	98.5	0.0224	9.5	0.718	-157.6
50	0.876	-160.5	17.909	94.9	0.0226	6.6	0.725	-161.7
60	0.869	-163.9	14.673	92.3	0.0225	4.4	0.732	-164.4
70	0.863	-166.0	12.569	90.4	0.0224	2.3	0.735	-166.3
80	0.860	-167.7	11.000	88.8	0.0223	1.1	0.738	-167.7
90	0.859	-168.8	9.788	87.2	0.0224	-0.1	0.740	-168.6
100	0.858	-169.9	8.793	85.8	0.0223	-1.3	0.741	-169.4
150	0.858	-173.0	5.780	79.5	0.0222	-6.5	0.750	-171.5
200	0.862	-174.9	4.290	74.0	0.0216	-10.7	0.759	-172.2
250	0.867	-175.8	3.381	69.2	0.0210	-13.5	0.770	-172.6
300	0.875	-176.7	2.768	64.8	0.0204	-16.8	0.780	-172.7
350	0.876	-177.4	2.316	60.6	0.0197	-19.0	0.793	-172.8
400	0.882	-178.2	1.981	56.0	0.0190	-21.7	0.808	-173.0
450	0.892	-178.7	1.724	52.4	0.0180	-23.6	0.816	-173.4
500	0.898	-179.5	1.508	48.7	0.0173	-25.5	0.828	-173.8
550	0.897	179.6	1.327	45.4	0.0165	-27.0	0.838	-174.2
600	0.907	178.9	1.192	41.6	0.0155	-28.4	0.849	-174.7
650	0.914	178.5	1.069	38.2	0.0145	-28.1	0.859	-175.2
700	0.915	177.4	0.950	34.9	0.0141	-25.4	0.867	-175.7
750	0.919	176.6	0.883	33.5	0.0146	-26.3	0.874	-176.2
800	0.924	176.0	0.804	30.0	0.0145	-27.1	0.884	-176.9
850	0.928	175.2	0.743	27.0	0.0150	-33.3	0.891	-177.6
900	0.928	174.0	0.683	24.9	0.0125	-38.2	0.897	-178.1
950	0.933	173.4	0.631	22.3	0.0111	-39.1	0.905	-178.7
1000	0.934	172.7	0.583	19.7	0.0097	-36.6	0.912	-179.5
1050	0.930	171.5	0.544	16.8	0.0089	-33.3	0.918	179.7
1100	0.937	170.7	0.515	14.9	0.0088	-29.4	0.924	179.1
1150	0.933	170.1	0.477	13.1	0.0082	-27.5	0.929	178.2
1200	0.929	169.2	0.453	10.1	0.0077	-25.3	0.930	177.3
1250	0.938	168.1	0.419	8.4	0.0074	-22.6	0.935	176.7
1300	0.935	167.7	0.396	6.4	0.0068	-20.8	0.934	175.8
1350	0.933	166.7	0.375	4.3	0.0063	-19.1	0.936	175.0
1400	0.936	165.5	0.348	2.3	0.0054	-14.1	0.939	174.1
1450	0.936	164.9	0.331	0.2	0.0051	-5.4	0.934	173.5
1500	0.926	163.8	0.315	-2.0	0.0042	-0.2	0.930	172.7

Table 2. Typical Common Emitter S-Parameters ( $V_{DS} = 28\text{ V}$ )

$I_D = 1.0\text{ A}$

f MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	S <sub>11</sub>	∠φ	S <sub>21</sub>	∠φ	S <sub>12</sub>	∠φ	S <sub>22</sub>	∠φ
20	0.964	-98.8	54.394	128.5	0.0143	39.3	0.429	-108.1
30	0.949	-120.9	43.459	117.7	0.0171	28.2	0.478	-124.6
40	0.909	-134.2	34.345	108.7	0.0179	19.7	0.520	-136.7
50	0.884	-142.4	28.265	102.7	0.0183	14.5	0.540	-144.0
60	0.875	-148.2	23.376	98.3	0.0186	10.7	0.553	-148.8
70	0.862	-152.4	20.099	95.1	0.0186	7.6	0.562	-152.0
80	0.861	-155.6	17.641	92.3	0.0186	5.3	0.569	-154.3
90	0.858	-157.9	15.722	89.9	0.0186	2.8	0.575	-155.9
100	0.858	-160.0	14.110	87.6	0.0186	1.1	0.580	-157.1
150	0.856	-165.9	9.261	78.5	0.0181	-6.6	0.606	-160.0
200	0.862	-169.4	6.802	71.0	0.0176	-11.6	0.633	-160.9
250	0.871	-171.0	5.291	64.9	0.0168	-16.1	0.661	-161.3
300	0.882	-172.7	4.272	59.3	0.0160	-20.7	0.690	-161.8
350	0.883	-173.9	3.520	54.1	0.0150	-23.3	0.718	-162.3
400	0.895	-175.2	2.969	48.8	0.0140	-25.9	0.747	-163.0
450	0.904	-176.0	2.539	44.6	0.0130	-27.9	0.767	-164.0
500	0.911	-177.0	2.197	40.5	0.0120	-29.8	0.789	-164.9
550	0.911	-178.2	1.904	36.8	0.0113	-29.6	0.807	-165.9
600	0.923	-179.2	1.688	32.8	0.0101	-30.2	0.825	-166.9
650	0.929	-179.9	1.496	29.5	0.0091	-28.9	0.841	-167.9
700	0.929	178.9	1.318	25.9	0.0088	-21.7	0.855	-168.9
750	0.933	177.9	1.206	24.4	0.0097	-21.6	0.865	-169.9
800	0.938	177.2	1.091	20.8	0.0093	-20.4	0.877	-170.9
850	0.942	176.3	1.000	18.0	0.0101	-31.4	0.886	-171.9
900	0.942	174.9	0.915	15.7	0.0077	-36.9	0.894	-172.8
950	0.947	174.2	0.839	13.2	0.0062	-37.6	0.904	-173.7
1000	0.946	173.4	0.772	11.1	0.0051	-27.6	0.912	-174.7
1050	0.943	172.2	0.718	8.0	0.0047	-17.6	0.919	-175.7
1100	0.948	171.4	0.672	6.2	0.0044	-9.0	0.926	-176.5
1150	0.945	170.7	0.620	4.0	0.0045	-0.8	0.932	-177.5
1200	0.939	169.8	0.587	1.1	0.0042	3.2	0.934	-178.7
1250	0.949	168.7	0.539	-0.7	0.0045	12.3	0.940	-179.5
1300	0.947	168.2	0.506	-3.0	0.0045	18.4	0.939	179.5
1350	0.944	167.1	0.478	-4.4	0.0046	22.3	0.941	178.5
1400	0.945	165.7	0.442	-6.9	0.0040	34.2	0.943	177.6
1450	0.944	165.3	0.421	-8.5	0.0047	44.9	0.940	176.8
1500	0.933	164.1	0.400	-10.4	0.0048	55.2	0.936	175.9

## PACKAGE DIMENSIONS

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.790	0.810	20.07	20.57
B	0.220	0.240	5.59	6.09
C	0.125	0.175	3.18	4.45
D	0.205	0.225	5.21	5.71
E	0.050	0.070	1.27	1.77
F	0.004	0.006	0.11	0.15
G	0.562 BSC 14.27 BSC			
H	0.070	0.090	1.78	2.29
K	0.215	0.255	5.47	6.47
N	0.350	0.370	8.89	9.39
Q	0.120	0.140	3.05	3.55

STYLE 1:  
PIN 1. DRAIN  
2. GATE  
3. SOURCE

**CASE 360B-01  
ISSUE O**

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.370	0.390	9.40	9.91
B	0.220	0.240	5.59	6.09
C	0.105	0.155	2.67	3.94
D	0.205	0.225	5.21	5.71
E	0.030	0.050	0.76	1.27
F	0.004	0.006	0.11	0.15
H	0.050	0.070	1.27	1.78
K	0.085	0.115	2.16	2.92
N	0.350	0.370	8.89	9.39

STYLE 1:  
PIN 1. DRAIN  
2. GATE  
3. SOURCE

**CASE 360C-02  
ISSUE A**

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