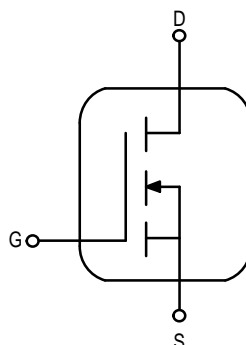


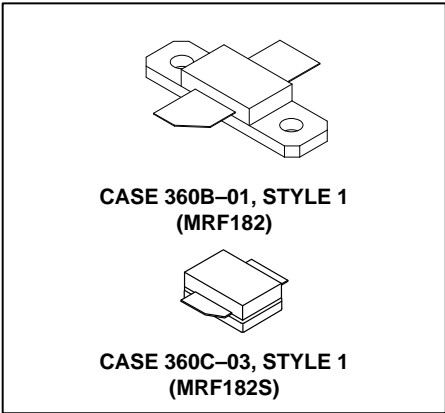
The RF MOSFET Line
RF Power
Field Effect Transistors
N-Channel Enhancement-Mode Lateral
MOSFETs

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



MRF182
MRF182S

30 W, 1.0 GHz
LATERAL N-CHANNEL
BROADBAND
RF POWER MOSFETs



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	65	Vdc
Gate-Source Voltage	V_{GS}	± 20	Vdc
Total Device Dissipation @ $T_C = 70^\circ\text{C}$ Derate above 70°C	P_D	74 0.57	W W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	- 65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.75	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ($V_{GS} = 0$, $I_D = 1.0 \mu\text{A}_{dc}$)	$V_{(BR)DSS}$	65	-	-	Vdc
Zero Gate Voltage Drain Current ($V_{DS} = 28 \text{ V}$, $V_{GS} = 0$)	I_{DSS}	-	-	1	μA_{dc}
Gate-Source Leakage Current ($V_{GS} = 20 \text{ V}$, $V_{DS} = 0$)	I_{GSS}	-	-	1	μA_{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)

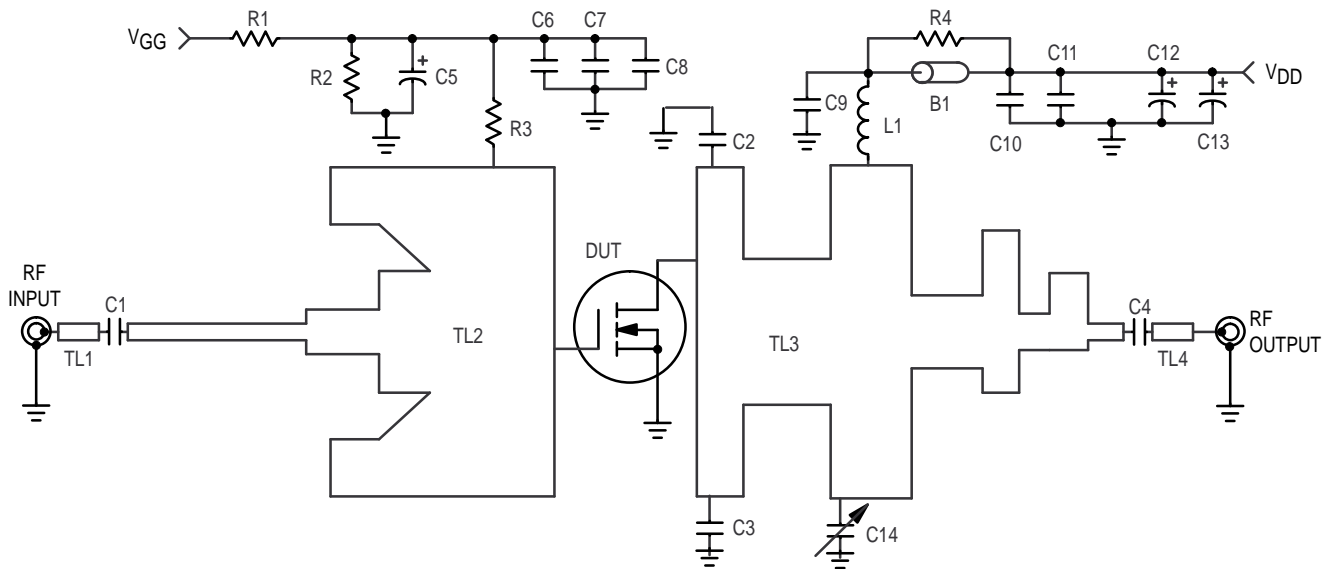
Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
Gate Threshold Voltage ($V_{DS} = 10\text{ V}$, $I_D = 100\ \mu\text{A}$)	$V_{GS(th)}$	2	3	4	Vdc
Gate Quiescent Voltage ($V_{DS} = 28\text{ V}$, $I_D = 50\text{ mA}$)	$V_{GS(Q)}$	3	4	5	Vdc
Drain–Source On–Voltage ($V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$)	$V_{DS(on)}$	–	0.9	1.2	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 ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$)	G_{ps}	11	14	–	dB
Drain Efficiency ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$)	η	50	60	–	%
Load Mismatch ($V_{DD} = 28\text{ Vdc}$, $P_{out} = 30\text{ W}$, $I_{DQ} = 50\text{ mA}$, $f = 945\text{ MHz}$, Load VSWR 5:1 at All Phase Angles)	Ψ	No Degradation in Output Power			
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



B1	Short RF Bead Fair Rite-274301944	L1	5 Turns, 20 AWG, IDIA 0.126
C1	18 pF Chip Capacitor	R1	10 k Ω , 1/4 W Resistor
C2, C3, C6, C9	43 pF Chip Capacitor	R2	13 k Ω , 1/4 W Resistor
C4	100 pF Chip Capacitor	R3	1.0 k Ω , 1/4 W Chip Resistor
C5, C12	10 μ F, 50 Vdc Electrolytic Capacitor	R4	4 x 39 Ω , 1/8 W Chip Resistor
C7, C10	1000 pF Chip Capacitor	"TL1-TL4	Microstrip Line See Photomaster
C8, C11	0.1 μ F, 50 Vdc Chip Capacitor	Ckt Board	1/32" Glass Teflon, $\epsilon_r = 2.55$
C13	250 μ F, 50 Vdc Electrolytic Capacitor		ARLON-GX-0300-55-22
C14	0.6-4.5 pF Variable Capacitor		

Figure 1. MRF182 Schematic

TYPICAL CHARACTERISTICS

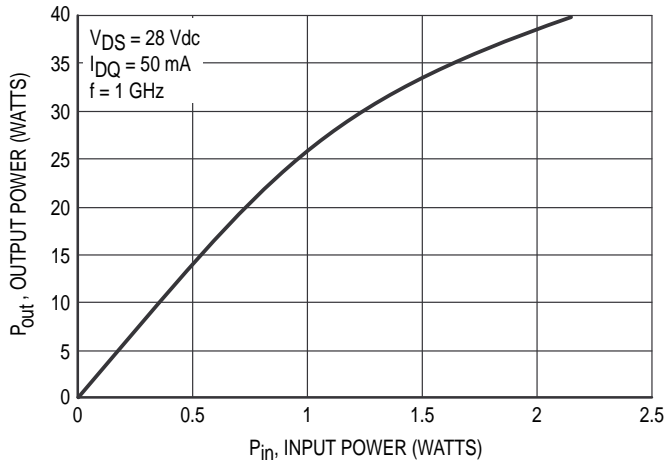


Figure 2. Output Power versus Input Power at 1 GHz

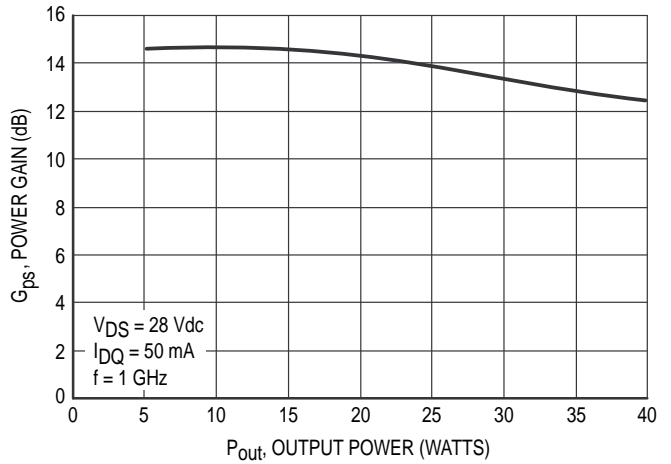


Figure 3. Power Gain versus Output Power at 1 GHz

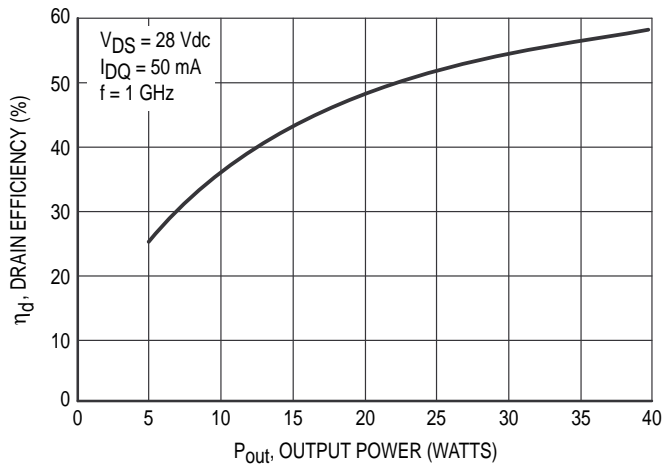


Figure 4. Drain Efficiency versus Output Power at 1 GHz

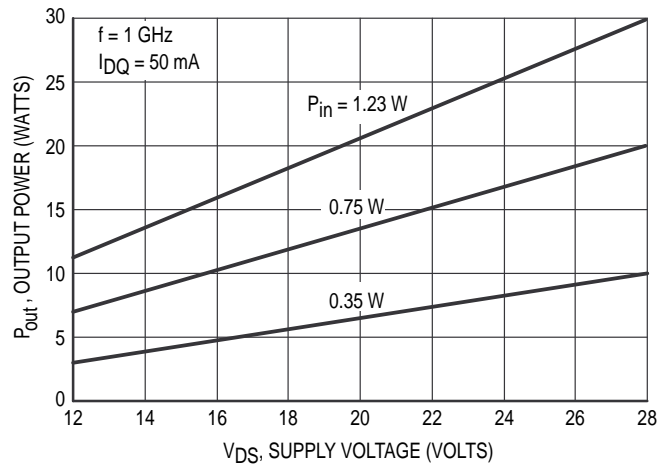


Figure 5. Output Power versus Supply Voltage

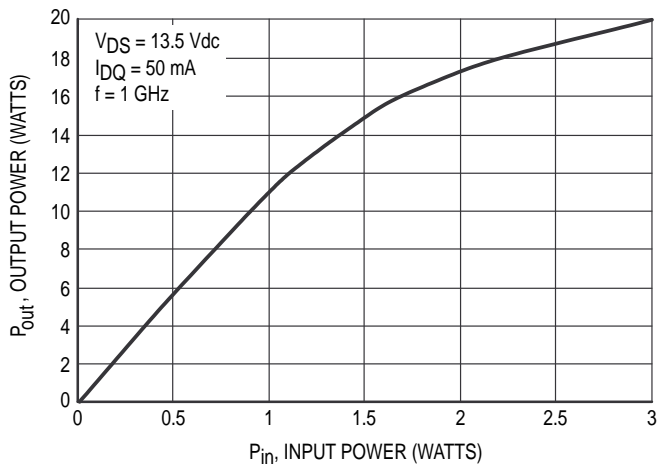


Figure 6. Output Power versus Input Power

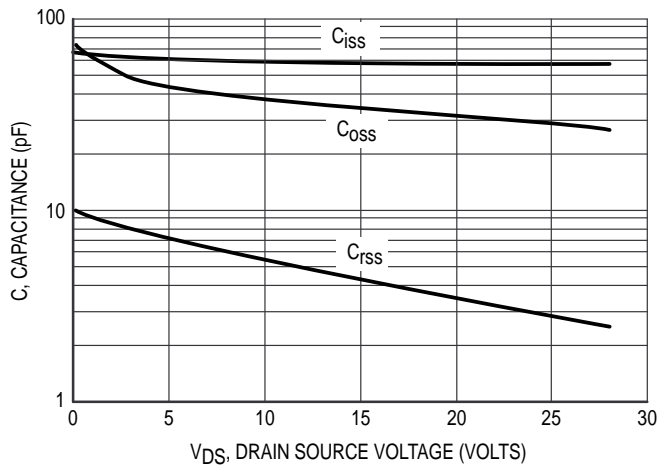


Figure 7. Capacitance versus Drain Source Voltage

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

$I_D = 1.0\text{ A}$

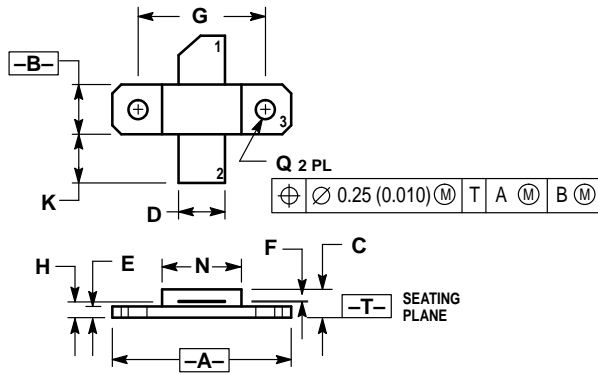
f MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	S ₁₁	∠φ	S ₂₁	∠φ	S ₁₂	∠φ	S ₂₂	∠φ
20	0.933	-131	40.81	112	0.021	22	0.664	-138
30	0.922	-148	29.31	104	0.022	15	0.700	-151
40	0.892	-156	22.19	99	0.022	10	0.718	-158
50	0.877	-161	17.91	95	0.023	7	0.725	-162
60	0.870	-164	14.67	92	0.023	4	0.732	-164
70	0.863	-166	12.57	90	0.022	2	0.735	-166
80	0.860	-168	11.00	89	0.022	1	0.738	-168
90	0.860	-169	9.79	87	0.022	0	0.740	-169
100	0.859	-170	8.79	86	0.022	-1	0.741	-169
150	0.859	-173	5.78	80	0.022	-7	0.750	-172
200	0.862	-175	4.29	74	0.022	-11	0.759	-172
250	0.868	-176	3.38	69	0.021	-14	0.770	-173
300	0.880	-177	2.77	65	0.020	-17	0.780	-173
350	0.877	-177	2.32	61	0.020	-19	0.793	-173
400	0.882	-178	1.98	56	0.019	-22	0.808	-173
450	0.892	-179	1.72	52	0.018	-24	0.816	-173
500	0.899	-180	1.51	49	0.017	-26	0.828	-174
550	0.898	180	1.33	45	0.017	-27	0.838	-174
600	0.907	179	1.19	42	0.016	-28	0.849	-175
650	0.914	179	1.07	38	0.015	-28	0.859	-175
700	0.916	177	0.95	35	0.014	-25	0.867	-176
750	0.920	177	0.88	34	0.015	-26	0.874	-176
800	0.924	176	0.80	30	0.015	-27	0.884	-177
850	0.929	175	0.74	27	0.015	-33	0.891	-178
900	0.929	174	0.68	25	0.013	-38	0.897	-178
950	0.933	173	0.63	22	0.011	-39	0.905	-179
1000	0.934	173	0.58	20	0.010	-37	0.912	-180
1050	0.930	172	0.54	17	0.009	-33	0.918	180
1100	0.938	171	0.52	15	0.009	-29	0.924	179
1150	0.933	170	0.48	13	0.008	-28	0.929	178
1200	0.930	169	0.45	10	0.008	-25	0.930	177
1250	0.939	168	0.42	8	0.007	-23	0.935	177
1300	0.936	168	0.40	6	0.007	-21	0.934	176
1350	0.933	167	0.38	4	0.006	-19	0.936	175
1400	0.937	166	0.35	2	0.005	-14	0.939	174
1450	0.937	165	0.33	0	0.005	-5	0.934	174
1500	0.927	164	0.32	-2	0.004	0	0.930	173

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

$I_D = 1.0\text{ A}$

f MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	S ₁₁	∠φ	S ₂₁	∠φ	S ₁₂	∠φ	S ₂₂	∠φ
20	0.964	-99	54.39	129	0.014	39	0.429	-108
30	0.949	-121	43.46	118	0.017	28	0.478	-125
40	0.909	-134	34.35	109	0.018	20	0.520	-137
50	0.884	-142	28.27	103	0.018	15	0.540	-144
60	0.875	-148	23.38	98	0.019	11	0.553	-149
70	0.862	-152	20.10	95	0.019	8	0.562	-152
80	0.861	-156	17.64	92	0.019	5	0.569	-154
90	0.858	-158	15.72	90	0.019	3	0.575	-156
100	0.858	-160	14.11	88	0.019	1	0.580	-157
150	0.856	-166	9.26	79	0.018	-7	0.606	-160
200	0.862	-169	6.80	71	0.018	-12	0.633	-161
250	0.871	-171	5.29	65	0.017	-16	0.661	-161
300	0.882	-173	4.27	59	0.016	-21	0.690	-162
350	0.883	-174	3.52	54	0.015	-23	0.718	-162
400	0.895	-175	2.97	49	0.014	-26	0.747	-163
450	0.904	-176	2.54	45	0.013	-28	0.767	-164
500	0.911	-177	2.20	41	0.012	-30	0.789	-165
550	0.911	-178	1.90	37	0.011	-30	0.807	-166
600	0.923	-179	1.69	33	0.010	-30	0.825	-167
650	0.929	-180	1.50	30	0.009	-29	0.841	-168
700	0.929	179	1.32	26	0.009	-22	0.855	-169
750	0.933	178	1.21	24	0.010	-22	0.865	-170
800	0.938	177	1.09	21	0.009	-20	0.877	-171
850	0.942	176	1.00	18	0.010	-31	0.886	-172
900	0.942	175	0.92	16	0.008	-37	0.894	-173
950	0.947	174	0.84	13	0.006	-38	0.904	-174
1000	0.946	173	0.77	11	0.005	-28	0.912	-175
1050	0.943	172	0.72	8	0.005	-18	0.919	-176
1100	0.948	171	0.67	6	0.004	-9	0.926	-177
1150	0.945	171	0.62	4	0.005	0	0.932	-178
1200	0.939	170	0.59	1	0.004	3	0.934	-179
1250	0.949	169	0.54	0	0.005	12	0.940	-180
1300	0.947	168	0.51	-3	0.005	18	0.939	180
1350	0.944	167	0.48	-4	0.005	22	0.941	179
1400	0.945	166	0.44	-7	0.004	34	0.943	178
1450	0.944	165	0.42	-9	0.005	45	0.940	177
1500	0.933	164	0.40	-10	0.005	55	0.936	176

PACKAGE DIMENSIONS

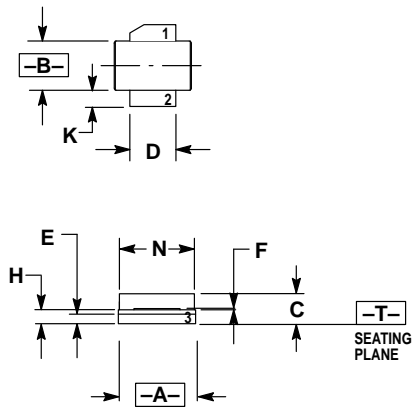


- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

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
 (MRF182)**




- 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	0.035	0.045	0.89	1.14
F	0.004	0.006	0.11	0.15
H	0.057	0.067	1.45	1.70
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-03
 ISSUE B
 (MRF182S)**

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