The RF MOSFET Line

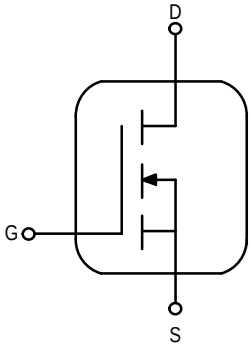
RF Power Field Effect Transistors

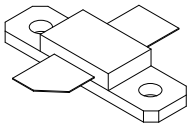
N–Channel Enhancement–Mode Lateral MOSFETs

MRF182
MRF182S

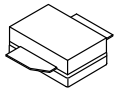
- High Gain, Rugged Device
- Broadband Performance from HF to 1 GHz
- Bottom Side Source Eliminates DC Isolators, Reducing Common Mode Inductances

**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}	±20	Vdc
Storage Temperature Range	T_{stg}	– 65 to +150	°C
Operating Junction Temperature	T_J	200	°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	117 0.67	W W/°C

THERMAL CHARACTERISTICS

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

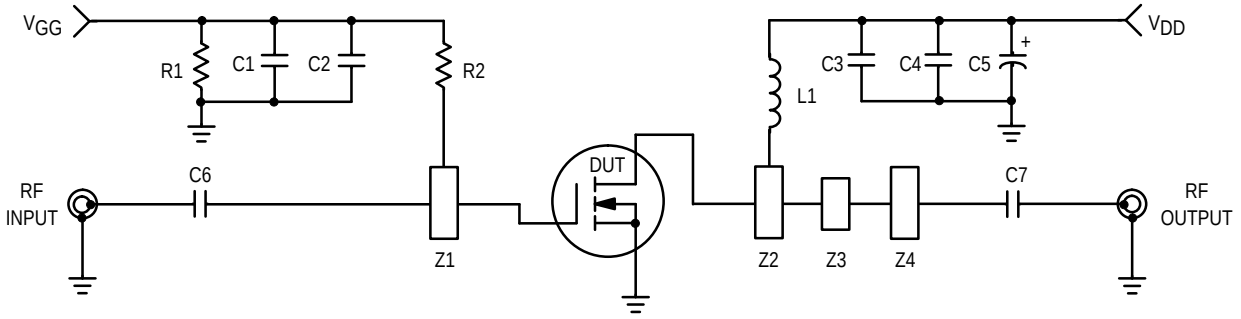
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain–Source Breakdown Voltage (V_{GS} = 0, I_D = 50 μA)	$V_{(BR)DSS}$	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	μAdc

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°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
Gate Threshold Voltage (V_{DS} = 10 V, I_D = 50 mA)	$V_{GS(th)}$	1	3	5	Vdc
Drain–Source On–Voltage (V_{GS} = 10 V, I_D = 1 A)	$V_{DS(on)}$	–	0.34	–	Vdc
Forward Transconductance (V_{DS} = 10 V, I_D = 3 A)	g_{fs}	1.6	1.8	–	S
DYNAMIC CHARACTERISTICS					
Input Capacitance (V_{DS} = 28 V, V_{GS} = 0, f = 1 MHz)	C_{iss}	–	56	–	pF
Output Capacitance (V_{DS} = 28 V, V_{GS} = 0, f = 1 MHz)	C_{oss}	–	28	–	pF
Reverse Transfer Capacitance (V_{DS} = 28 V, V_{GS} = 0, f = 1 MHz)	C_{rss}	–	2.5	–	pF
FUNCTIONAL CHARACTERISTICS					
Common Source Power Gain (V_{DD} = 28 Vdc, P_{out} = 30 W, I_{DQ} = 50 mA, f = 960 MHz)	G_{ps}	11	13	–	dB
Drain Efficiency (V_{DD} = 28 Vdc, P_{out} = 30 W, I_{DQ} = 50 mA, f = 960 MHz)	η	45	55	–	%
Series Equivalent Input Impedance (V_{DD} = 28 Vdc, P_{out} = 30 W, I_{DQ} = 50 mA, f = 960 MHz)	Z_{in}	–	0.81 + j1.6	–	ohms
Series Equivalent Output Impedance (V_{DD} = 28 Vdc, P_{out} = 30 W, I_{DQ} = 50 mA, f = 960 MHz)	Z_{out}	–	2.15 – j1.7	–	ohms



C1, C3 — 0.1 μF Ceramic Capacitor
C2, C4 — 240 pF 0.1″ Chip Capacitor
C5 — 150 μF, 50 V Electrolytic Capacitor
C6, C7 — 220 pF 0.1″ Chip Capacitor
L1–3T, #18 AWG 1/8″ ID 0.285″ Long
R1 — 1 KΩ, 1/4 W
R2 — 10 KΩ, 1/4 W
Z1–Z4 — Microstrip

Figure 1. Test Circuit Schematic

TYPICAL CHARACTERISTICS

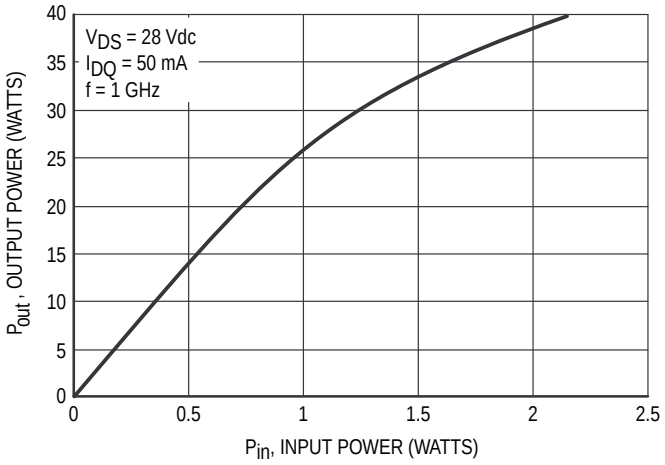


Figure 2. Output Power versus Input Power at 1 GHz

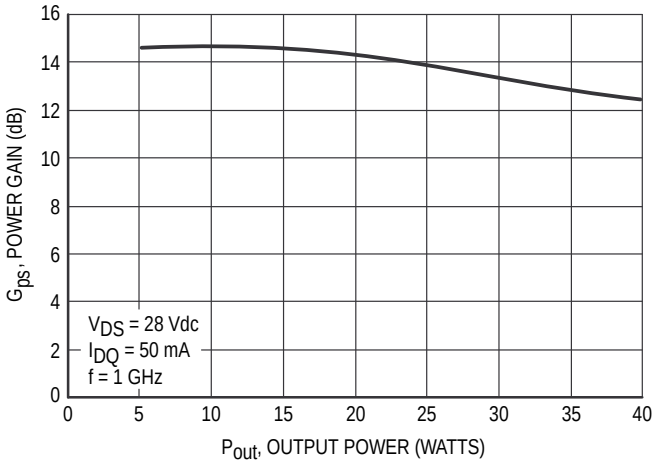


Figure 3. Power Gain versus Output Power at 1 GHz

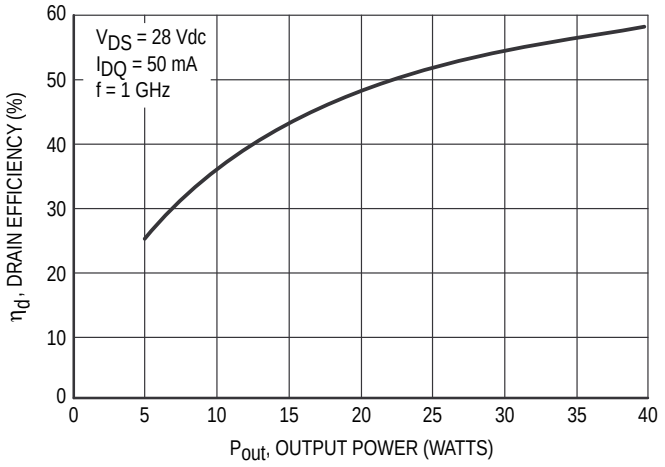


Figure 4. Drain Efficiency versus Output Power at 1 GHz

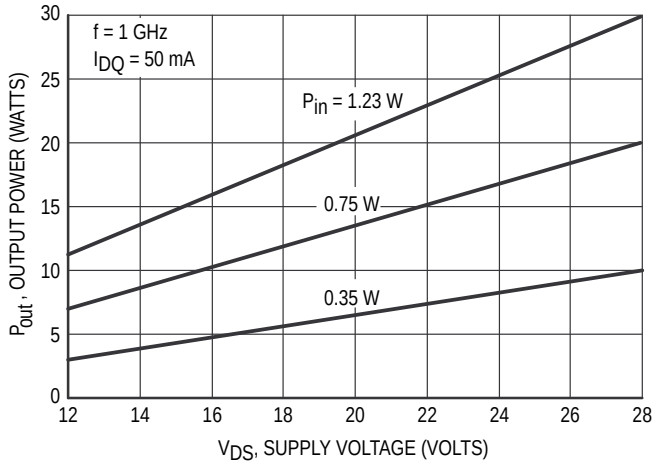


Figure 5. Output Power versus Supply Voltage

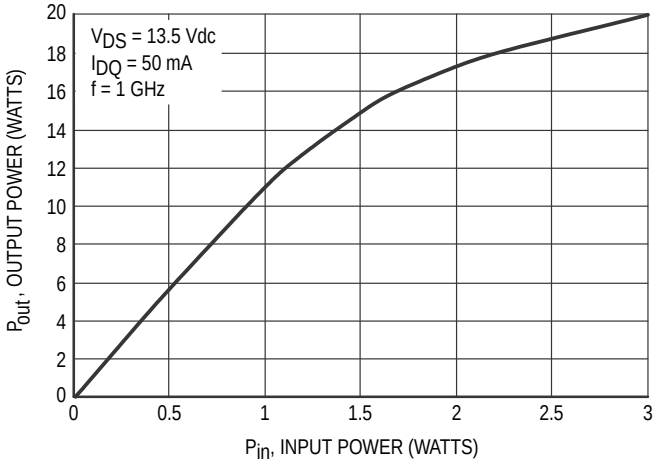


Figure 6. Output Power versus Input Power

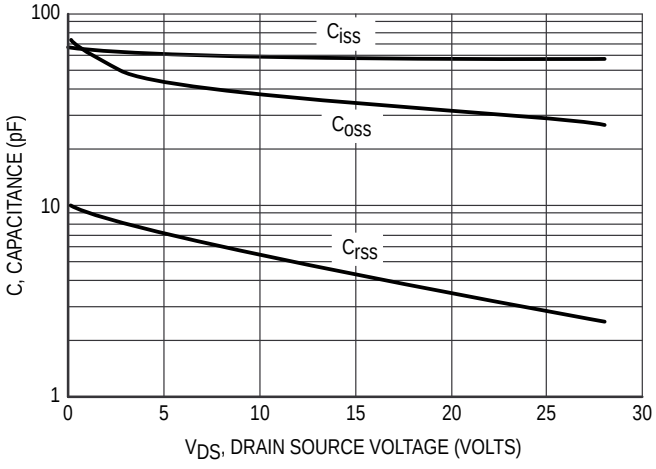


Figure 7. Capacitance versus Drain Source Voltage

Table 1. Typical Common Source S–Parameters (V_{DS} = 13.5 V)

I_D = 1.0 A

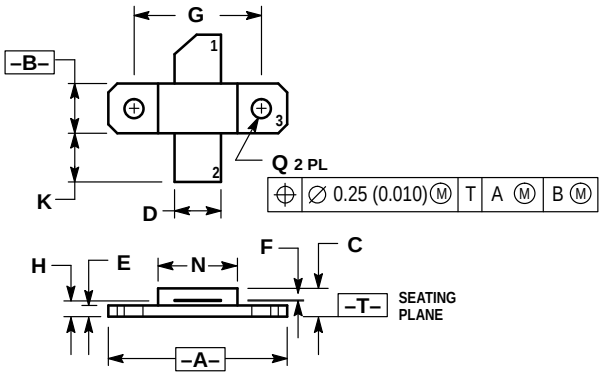
f	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	$\|S_{11}\|$	∠ϕ	$\|S_{21}\|$	∠ϕ	$\|S_{12}\|$	∠ϕ	$\|S_{22}\|$	∠ϕ
20	0.933	–131.2	40.806	111.9	0.0207	22.6	0.664	–138.4
30	0.922	–147.7	29.305	104.0	0.0222	15.0	0.700	–150.5
40	0.892	–155.8	22.187	98.5	0.0224	9.5	0.718	–157.6
50	0.876	–160.5	17.909	94.9	0.0226	6.6	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 V)

I_D = 1.0 A

f	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	$\|S_{11}\|$	∠ϕ	$\|S_{21}\|$	∠ϕ	$\|S_{12}\|$	∠ϕ	$\|S_{22}\|$	∠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

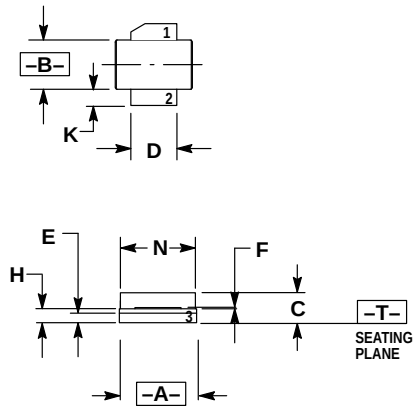


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	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.

	INCHES		MILLIMETERS	
DIM	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

How to reach us:
USA / EUROPE: Motorola Literature Distribution;
P.O. Box 20912; Phoenix, Arizona 85036. 1–800–441–2447

MFAX: RMFAX0@email.sps.mot.com – TOUCHTONE (602) 244–6609
INTERNET: http://Design–NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi–SPD–JLDC, Toshikatsu Otsuki,
6F Seibu–Butsuryu–Center, 3–14–2 Tatsumi Koto–Ku, Tokyo 135, Japan. 03–3521–8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852–26629298