

The RF MOSFET Line

RF Power Field Effect Transistors

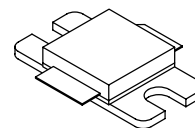
N-Channel Enhancement-Mode Lateral MOSFETs

MRF19030LR3
MRF19030LSR3

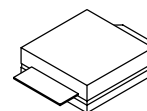
Designed for class AB PCN and PCS base station applications with frequencies from 1.8 to 2.0 GHz. Suitable for FM, TDMA, CDMA and multicarrier amplifier applications.

- CDMA Performance @ 1990 MHz, 26 Volts
IS-97 CDMA Pilot, Sync, Paging, Traffic Codes 8 Thru 13
885 kHz — -47 dBc @ 30 kHz BW
1.25 MHz — -55 dBc @ 12.5 kHz BW
2.25 MHz — -55 dBc @ 1 MHz BW
Output Power — 4.5 Watts Avg.
Power Gain — 13.5 dB
Efficiency — 17%
- Internally Matched, Controlled Q, for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Capable of Handling 10:1 VSWR, @ 26 Vdc, 1.93 GHz, 30 Watts CW Output Power
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Low Gold Plating Thickness on Leads, 40μ" Nominal.
- In Tape and Reel. R3 Suffix = 250 Units per 32 mm, 13 Inch Reel.

2.0 GHz, 30 W, 26 V
LATERAL N-CHANNEL
RF POWER MOSFETs



CASE 465E-04, STYLE 1
NI-400
MRF19030LR3



CASE 465F-04, STYLE 1
NI-400S
MRF19030LSR3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	83.3 0.48	Watts 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	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.1	$^\circ\text{C/W}$

ESD PROTECTION CHARACTERISTICS

Test Conditions	Class
Human Body Model	2 (Minimum)
Machine Model	M3 (Minimum)

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

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Drain-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 20 μA)	V _{(BR)DSS}	65	—	—	Vdc
Zero Gate Voltage Drain Current (V _{DS} = 28 Vdc, V _{GS} = 0 Vdc)	I _{DSS}	—	—	1	μAdc
Gate-Source Leakage Current (V _{GS} = 5 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	—	—	1	μAdc
ON CHARACTERISTICS					
Gate Threshold Voltage (V _{DS} = 10 Vdc, I _D = 100 μAdc)	V _{GS(th)}	2	3	4	Vdc
Gate Quiescent Voltage (V _{DS} = 28 Vdc, I _D = 300 mA)	V _{GS(Q)}	2	3.3	4.5	Vdc
Drain-Source On-Voltage (V _{GS} = 10 Vdc, I _D = 1 Adc)	V _{DS(on)}	—	0.29	0.4	Vdc
Forward Transconductance (V _{DS} = 10 Vdc, I _D = 1 Adc)	g _{fs}	—	2	—	S
DYNAMIC CHARACTERISTICS					
Input Capacitance (Including Input Matching Capacitor in Package) (1) (V _{DS} = 26 Vdc, V _{GS} = 0, f = 1 MHz)	C _{iss}	—	98.5	—	pF
Output Capacitance (1) (V _{DS} = 26 Vdc, V _{GS} = 0, f = 1 MHz)	C _{oss}	—	37	—	pF
Reverse Transfer Capacitance (V _{DS} = 26 Vdc, V _{GS} = 0, f = 1 MHz)	C _{rss}	—	1.3	—	pF
FUNCTIONAL TESTS (In Motorola Test Fixture, 50 ohm system)					
Two-Tone Common-Source Amplifier Power Gain (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1960.0 MHz, f ₂ = 1960.1 MHz)	G _{ps}	—	13	—	dB
Two-Tone Drain Efficiency (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1960.0 MHz, f ₂ = 1960.1 MHz)	η	—	36	—	%
3rd Order Intermodulation Distortion (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1960.0 MHz, f ₂ = 1960.1 MHz)	IMD	—	-31	—	dBc
Input Return Loss (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1960.0 MHz, f ₂ = 1960.1 MHz)	IRL	—	-13	—	dB
Two-Tone Common-Source Amplifier Power Gain (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1930.0 MHz, f ₂ = 1930.1 MHz and f ₁ = 1990.0 MHz, f ₂ = 1990.1 MHz)	G _{ps}	12	13	—	dB
Two-Tone Drain Efficiency (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1930.0 MHz, f ₂ = 1930.1 MHz and f ₁ = 1990.0 MHz, f ₂ = 1990.1 MHz)	η	33	36	—	%
3rd Order Intermodulation Distortion (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1930.0 MHz, f ₂ = 1930.1 MHz and f ₁ = 1990.0 MHz, f ₂ = 1990.1 MHz)	IMD	—	-31	-28	dBc
Input Return Loss (V _{DD} = 26 Vdc, P _{out} = 30 W PEP, I _{DQ} = 300 mA, f ₁ = 1930.0 MHz, f ₂ = 1930.1 MHz and f ₁ = 1990.0 MHz, f ₂ = 1990.1 MHz)	IRL	—	-13	-9	dB
Output Mismatch Stress (V _{DD} = 26 Vdc, P _{out} = 30 W CW, I _{DQ} = 300 mA, f = 1930 MHz, VSWR = 10:1, All Phase Angles at Frequency of Tests)	Ψ	No Degradation In Output Power Before and After Test			

(1) Part is internally matched both on input and output.

Freescale Semiconductor, Inc.

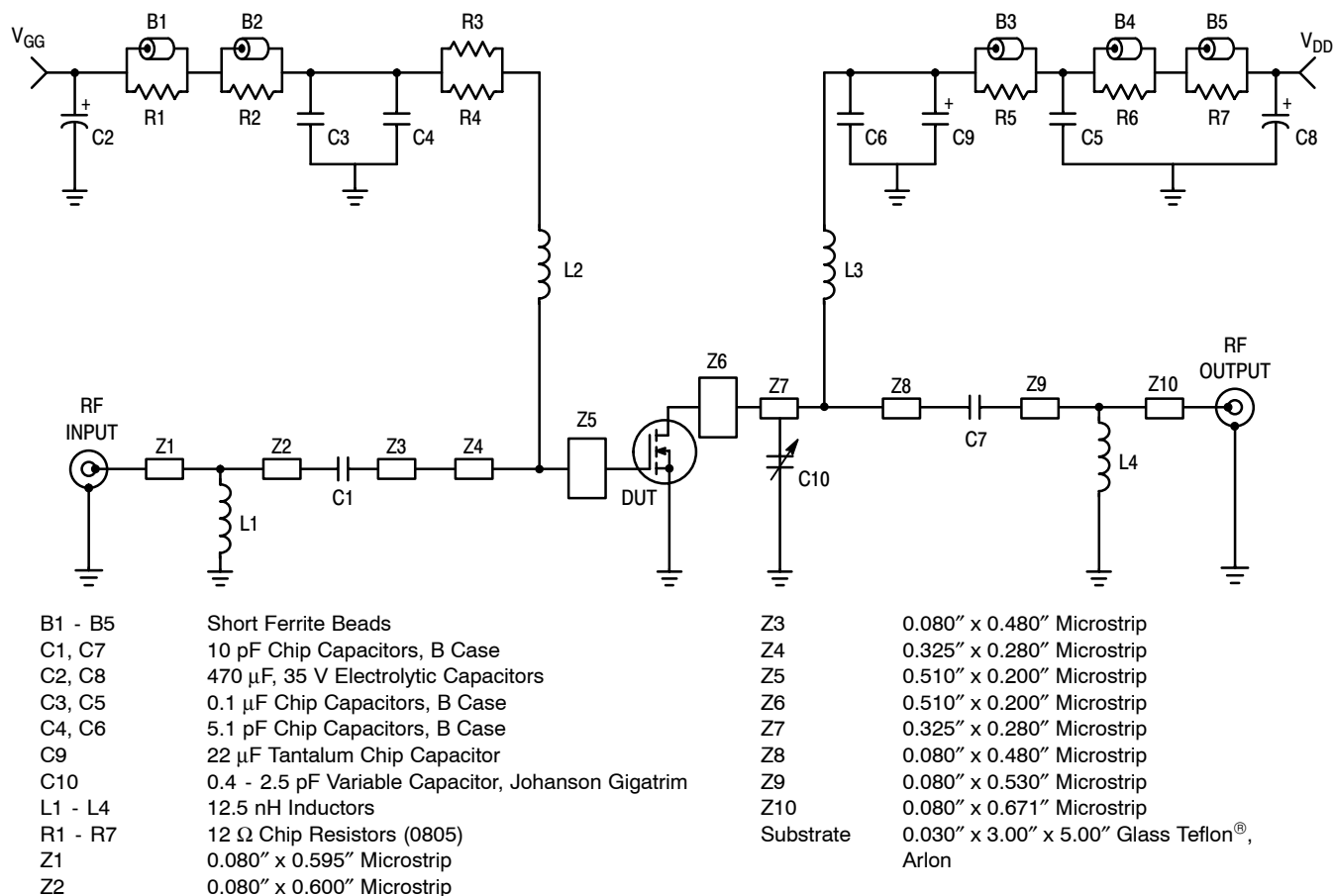


Figure 1. MRF19030LR3(LSR3) Test Circuit Schematic

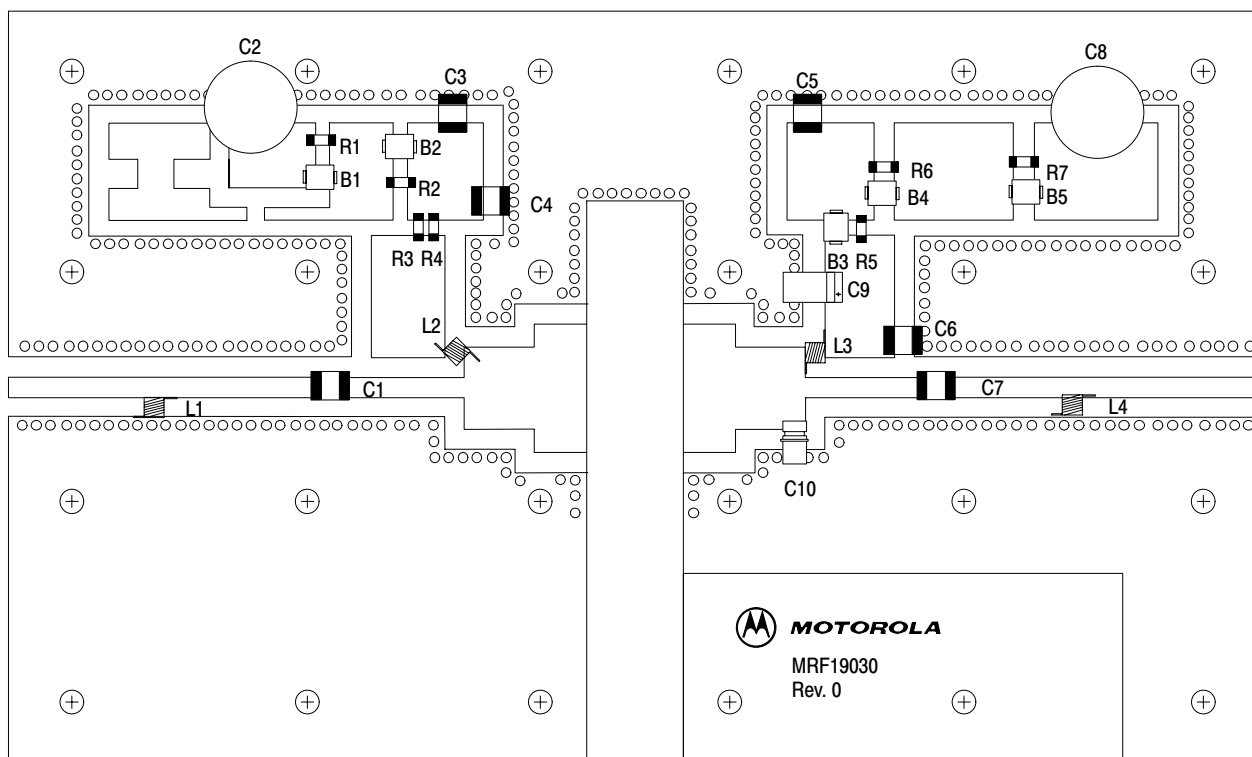


Figure 2. MRF19030LR3(LSR3) Test Circuit Component Layout

Freescale Semiconductor, Inc.

TYPICAL CHARACTERISTICS

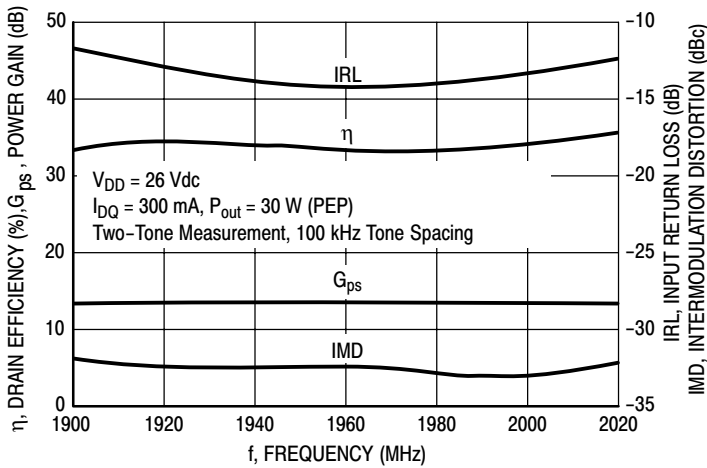


Figure 3. Class AB Broadband Circuit Performance

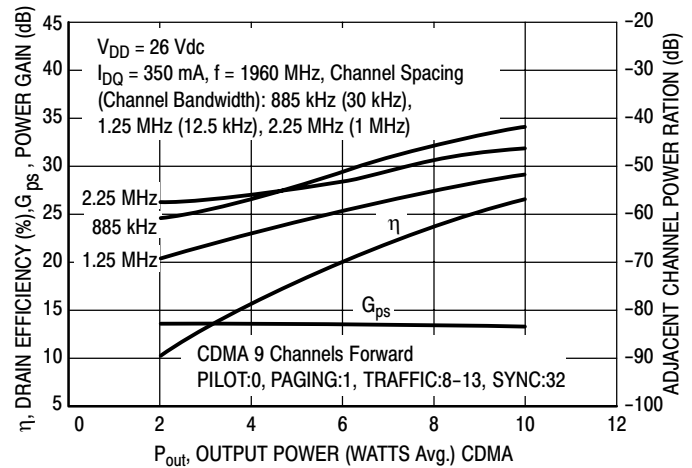


Figure 4. CDMA ACPR, Power Gain and Drain Efficiency versus Output Power

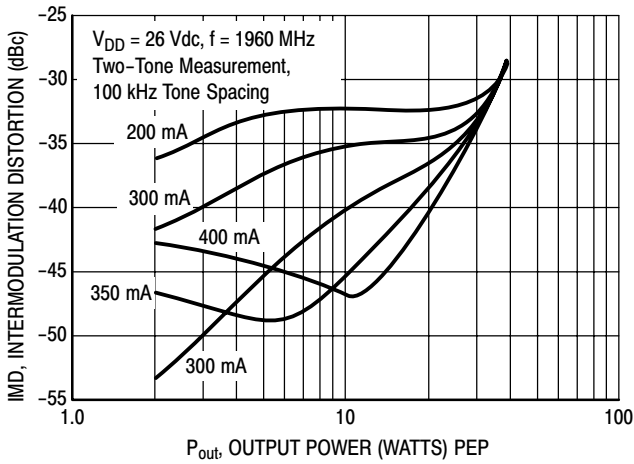


Figure 5. Intermodulation Distortion versus Output Power

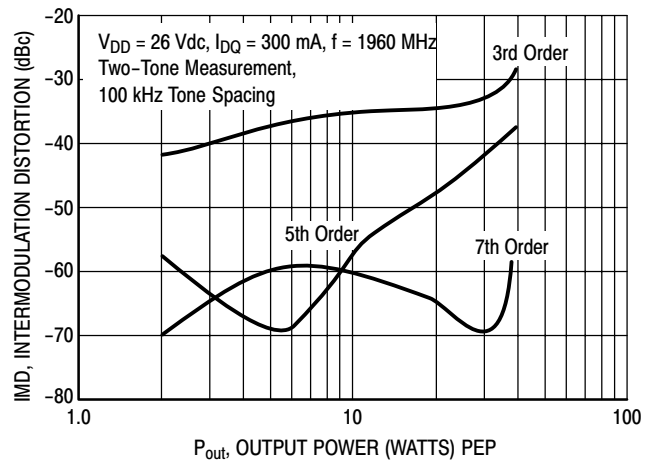


Figure 6. Intermodulation Distortion Products versus Output Power

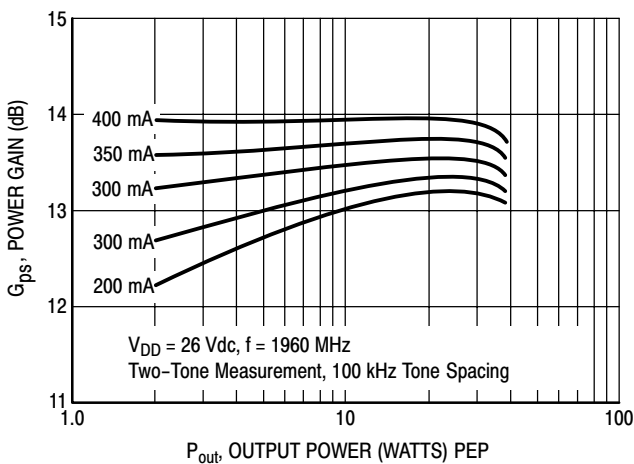


Figure 7. Power Gain versus Output Power

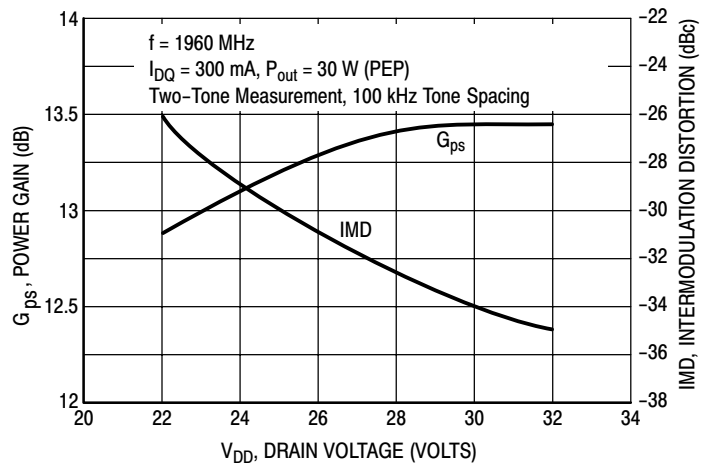
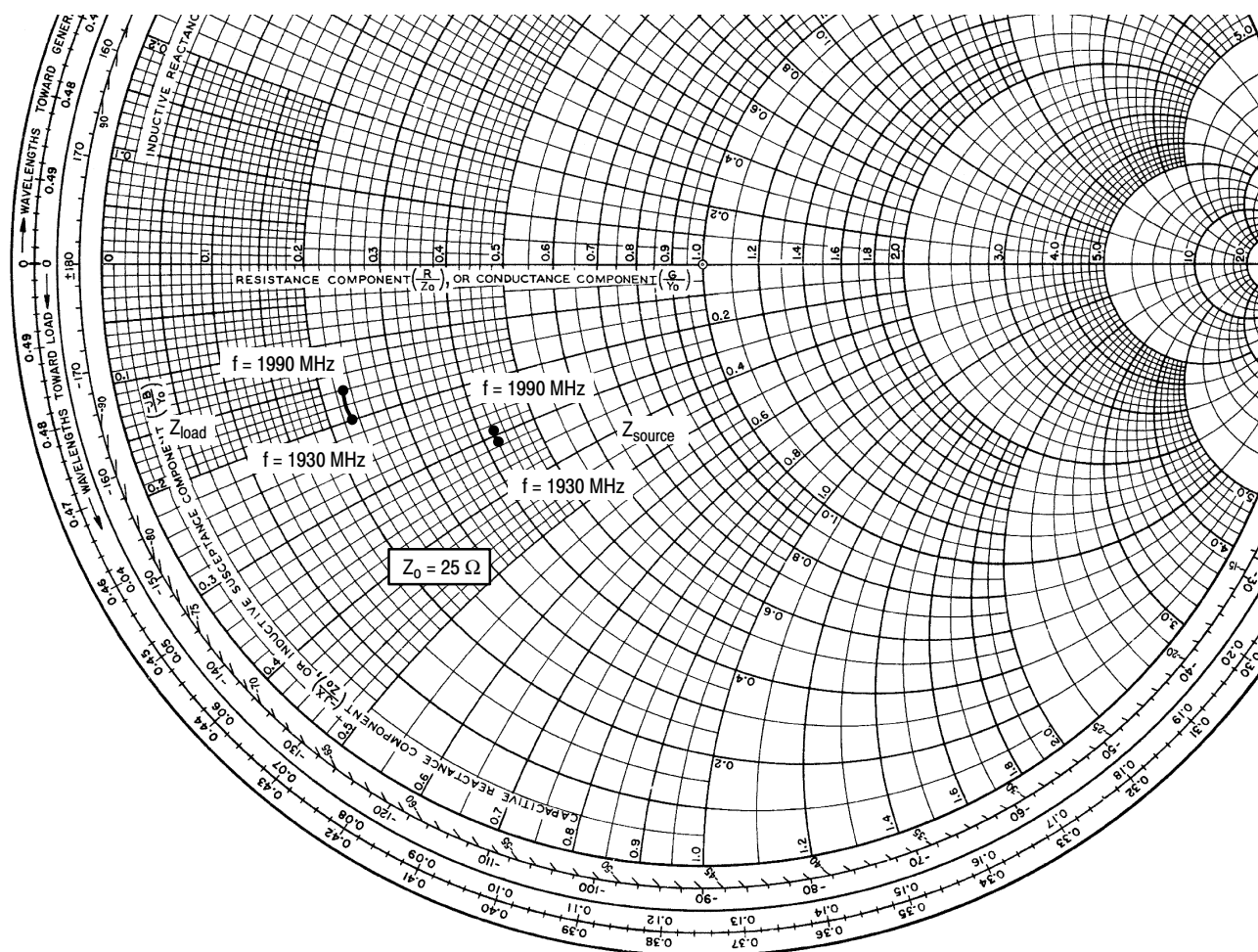


Figure 8. Power Gain and Intermodulation Distortion versus Supply Voltage



$V_{DD} = 26 \text{ V}$, $I_{DQ} = 300 \text{ mA}$, $P_{\text{out}} = 30 \text{ W PEP}$

f MHz	Z_{source} Ω	Z_{load} Ω
1930	$10.57 - j7.69$	$5.81 - j5.01$
1960	$10.54 - j7.43$	$5.84 - j4.67$
1990	$10.47 - j7.21$	$5.84 - j4.35$

Z_{source} = Test circuit impedance as measured from gate to ground.

Z_{load} = Test circuit impedance as measured from drain to ground.

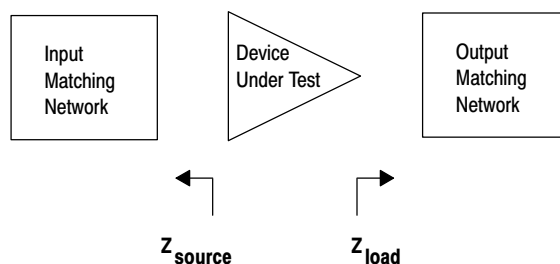


Figure 9. Series Equivalent Source and Load Impedance

NOTES

SEE NOTE 4

2X K

2X D

2X Ø Q

1

2

3

B

bbb (M) T B (M) A (M)

ccc (M) T A (M) B (M)

aaa (M) T A (M) B (M)

N (LID)

E

C

M (INSULATOR)

A

T SEATING PLANE

R (LID)

S

(INSULATOR)

F

H

ccc (M) T A (M) B (M)

aaa (M) T A (M) B (M)

STYLE 1:

PIN 1. DRAIN

2. GATE

3. SOURCE

NOTES:

1. CONTROLLING DIMENSION: INCH.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.
4. INFORMATION ONLY: CORNER BREAK (4X) TO BE .060±.005 (1.52±0.13) RADIUS OR .06±.005 (1.52±0.13) x 45° CHAMFER.

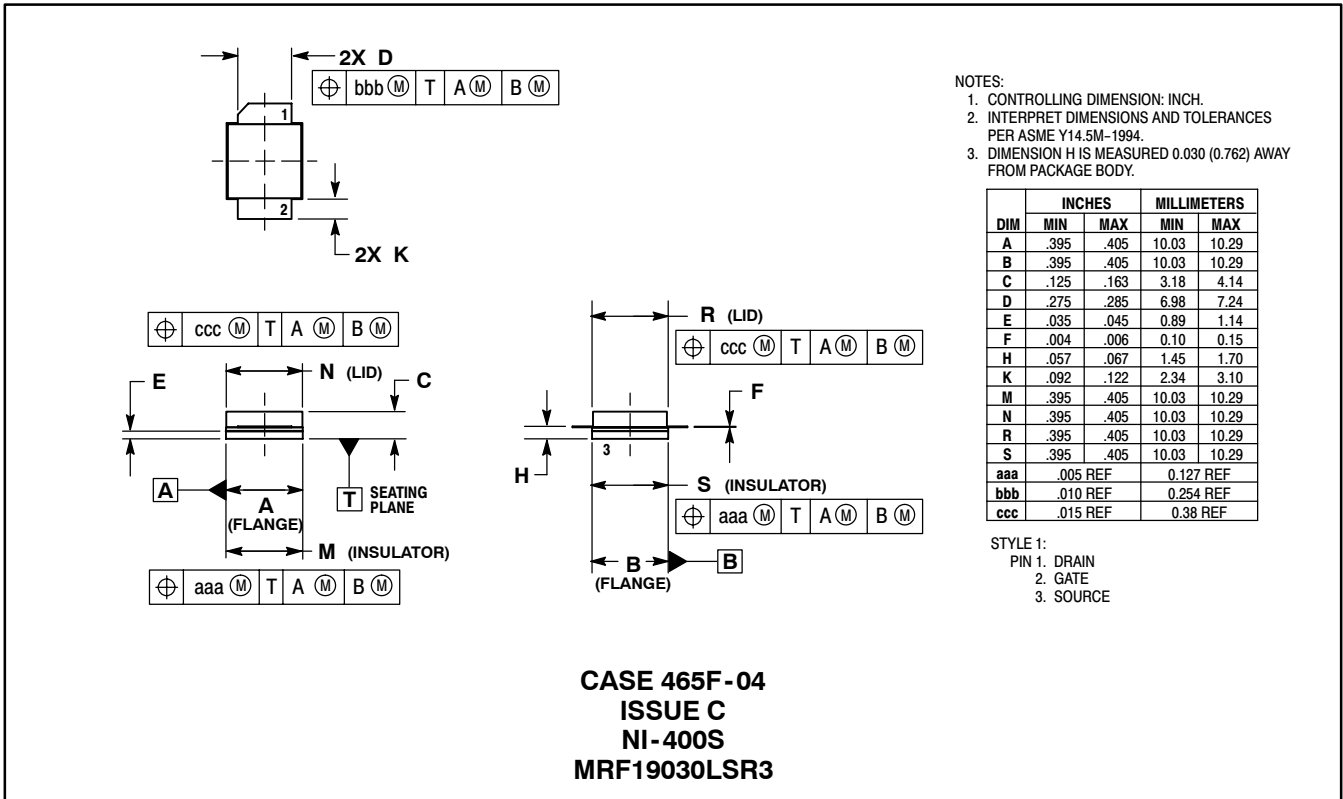
DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.795	.805	20.19	20.44
B	.380	.390	9.65	9.9
C	.125	.163	3.17	4.14
D	.275	.285	6.98	7.24
E	.035	.045	0.89	1.14
F	.004	.006	0.10	0.15
G	.600 BSC	15.24 BSC		
H	.057	.067	1.45	1.7
K	.092	.122	2.33	3.1
M	.395	.405	10	10.3
N	.395	.405	10	10.3
Q	Ø .120	Ø .130	Ø 3.05	Ø 3.3
R	.395	.405	10	10.3
S	.395	.405	10	10.3
aaa	.005 BSC	0.127 BSC		
bbb	.010 BSC	0.254 BSC		
ccc	.015 BSC	0.381 BSC		

CASE 465E-04

ISSUE E

NI-400

MRF19030LR3



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