

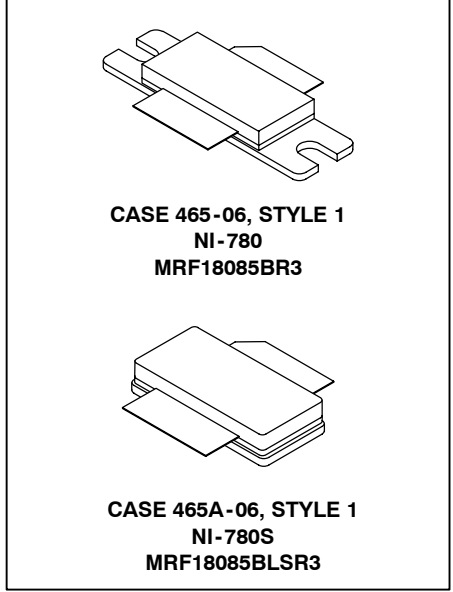
The RF MOSFET Line  
**RF Power Field Effect Transistors**  
**N-Channel Enhancement-Mode Lateral MOSFETs**

**MRF18085BR3**  
**MRF18085BLSR3**

Designed for GSM and GSM EDGE base station applications with frequencies from 1.9 to 2.0 GHz. Suitable for TDMA, CDMA, and multicarrier amplifier applications.

- GSM and GSM EDGE Performance, Full Frequency Band (1930 - 1990 MHz)  
 Power Gain - 12.5 dB (Typ) @ 85 Watts CW  
 Efficiency - 50% (Typ) @ 85 Watts CW
- 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 5:1 VSWR, @ 26 Vdc, @ P1dB Output Power, @ f = 1930 MHz
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Available with Low Gold Plating Thickness on Leads. L Suffix Indicates 40μ" Nominal.
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.

**GSM/GSM EDGE**  
**1.9 - 1.99 GHz, 85 W, 26 V**  
**LATERAL N-CHANNEL**  
**RF POWER MOSFETs**



**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	65	Vdc
Gate-Source Voltage	V <sub>GS</sub>	-0.5, +15	Vdc
Total Device Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	P <sub>D</sub>	273 1.56	Watts W/°C
Storage Temperature Range	T <sub>stg</sub>	- 65 to +150	°C
Operating Junction Temperature	T <sub>J</sub>	200	°C

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Value (1)	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	0.79	°C/W

**ESD PROTECTION CHARACTERISTICS**

Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M3 (Minimum)

(1) Refer to AN1955/D, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <http://www.motorola.com/semiconductors/rf>. Select Documentation/Application Notes - AN1955.

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

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## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 100 μAdc)	V <sub>(BR)DSS</sub>	65	—	—	Vdc
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 26 Vdc, V <sub>GS</sub> = 0 Vdc)	I <sub>DSS</sub>	—	—	10	μAdc
Gate-Source Leakage Current (V <sub>GS</sub> = 5 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	—	—	1	μAdc

### ON CHARACTERISTICS

Gate Threshold Voltage (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 200 μAdc)	V <sub>GS(th)</sub>	2	—	4	Vdc
Gate Quiescent Voltage (V <sub>DS</sub> = 26 Vdc, I <sub>D</sub> = 600 mAdc)	V <sub>GS(Q)</sub>	2.5	3.9	4.5	Vdc
Drain-Source On-Voltage (V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 2 Adc)	V <sub>DS(on)</sub>	—	0.18	0.21	Vdc
Forward Transconductance (V <sub>DS</sub> = 10 Vdc, I <sub>D</sub> = 2 Adc)	g <sub>fs</sub>	—	6.0	—	S

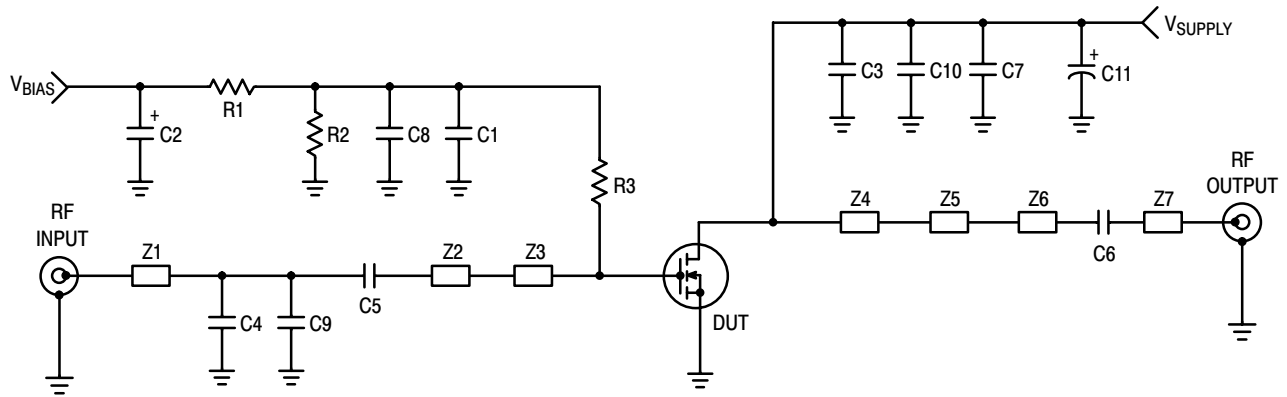
### DYNAMIC CHARACTERISTICS

Reverse Transfer Capacitance (1) (V <sub>DS</sub> = 26 Vdc, V <sub>GS</sub> = 0, f = 1 MHz)	C <sub>rss</sub>	—	3.6	—	pF
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### FUNCTIONAL TESTS (In Motorola Test Fixture, 50 ohm system)

Common-Source Amplifier Power Gain @ 85 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 800 mA, f = 1930 - 1990 MHz)	G <sub>ps</sub>	11.5	12.5	—	dB
Drain Efficiency @ 85 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 800 mA, f = 1930 - 1990 MHz)	η	46	50	—	%
Input Return Loss @ 85 W (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 800 mA, f = 1930 - 1990 MHz)	IRL	—	-12	-9	dB
P1 dB Output Power (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 800 mA, f = 1930 - 1990 MHz)	P1dB	80	90	—	Watts
Output Mismatch Stress @ P1dB (V <sub>DD</sub> = 26 Vdc, I <sub>DQ</sub> = 600 mA, f = 1930 MHz, VSWR = 5:1, 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.



C1, C10	1.0 nF Chip Capacitors, B Case, ATC	Z1	1.654" x 0.082" Microstrip
C2	10 $\mu$ F, 35 V Tantalum Capacitor	Z2	0.207" x 0.082" Microstrip
C3, C6	10 pF Chip Capacitors, B Case, ATC	Z3	0.362" x 1.260" Microstrip
C4	3.3 pF Chip Capacitor, B Case, ATC	Z4	0.583" x 0.669" Microstrip
C5	4.7 pF Chip Capacitor, B Case, ATC	Z5	0.449" x 0.179" Microstrip
C7, C8	100 nF Chip Capacitors, ACCU-P (1206)	Z6	0.877" x 0.082" Microstrip
C9	3.9 pF Chip Capacitor, B Case, ATC	Z7	0.326" x 0.082" Microstrip
C11	470 $\mu$ F, 63 V Electrolytic Capacitor	PCB	0.030" Glass Teflon <sup>®</sup> ( $\epsilon_r = 2.55$ )
R1, R2	1.0 k $\Omega$ Chip Resistors (0805)		
R3	2 x 18 k $\Omega$ Chip Resistor (1206)		

Figure 1. 1.93 - 1.99 GHz Test Fixture Schematic

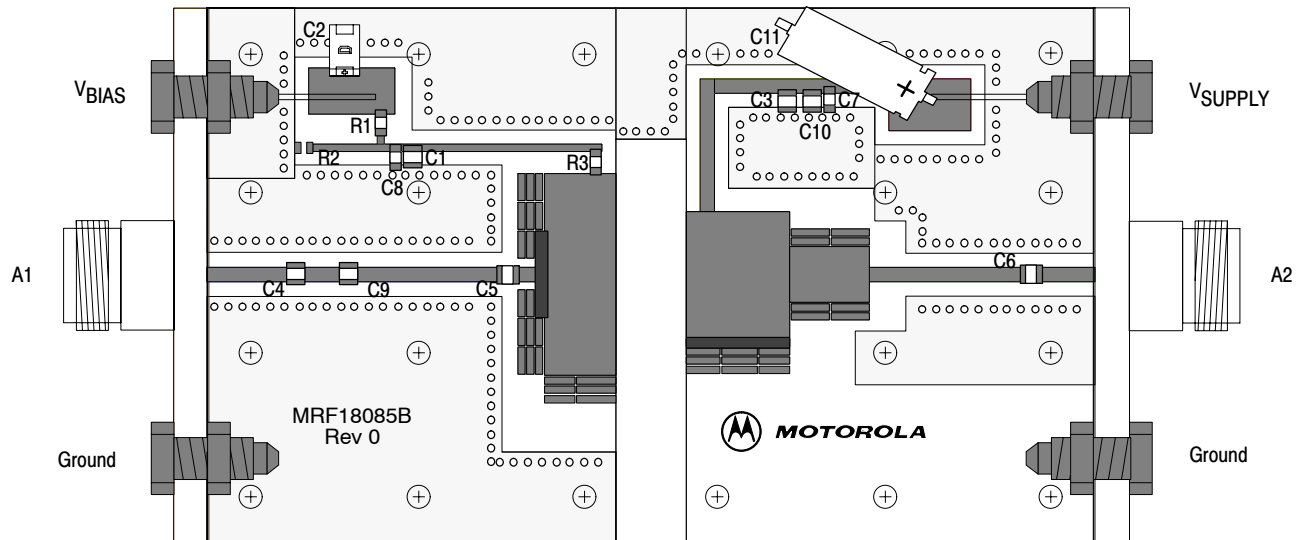
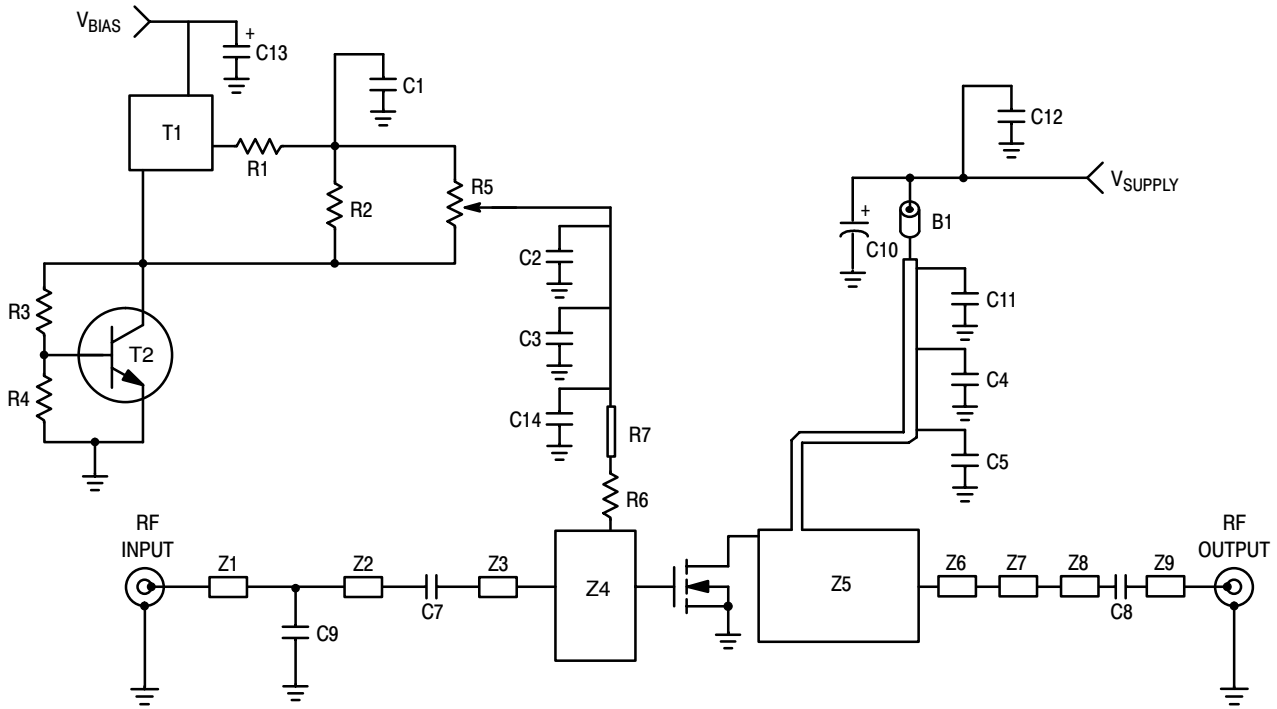


Figure 2. 1.93 - 1.99 GHz Test Fixture Component Layout



B1	Short RF Ferrite Bead, #27 430119447	R1	10 $\Omega$ Chip Resistor (0805)
C1, C2	1 $\mu$ F Chip Capacitors, ACCU-P (0805)	R2	1 k $\Omega$ Chip Resistor (0805)
C3, C4	1 nF Chip Capacitors, ACCU-P (0805)	R3	1.2 k $\Omega$ Chip Resistor (0805)
C5	10 pF Chip Capacitor, ACCU-P (0805)	R4	2.2 k $\Omega$ Chip Resistor (0805)
C7	1.5 pF Chip Capacitor, ACCU-P (0805)	R5	5 k $\Omega$ Chip Resistor (0805)
C8	8.2 pF Chip Capacitor, ACCU-P (0805)	R6, R7	9 $\Omega$ Chip Resistors (1206) (18 $\Omega$ x 18 $\Omega$ )
C9	1.0 pF Chip Capacitor, ACCU-P (0805)	T1	Voltage Regulator, Micro-8, Motorola #LP2951
C10	100 $\mu$ F, 63 V Electrolytic Capacitor	T2	NPN Bipolar Transistor, SOT-23, Motorola #BC847
C11, C12	10 nF Chip Capacitors (0805)	Z1 - Z9	Printed Transmission Lines
C13	10 $\mu$ F, 35 V Tantalum Capacitor	Substrate	0.5 mm Rogers 4350 ( $\epsilon_r = 3.53$ )
C14	8.2 pF Chip Capacitor, ACCU-P (0805)		

Figure 3. 1.93 - 1.99 GHz GSM EDGE Optimized Demo Board Schematic

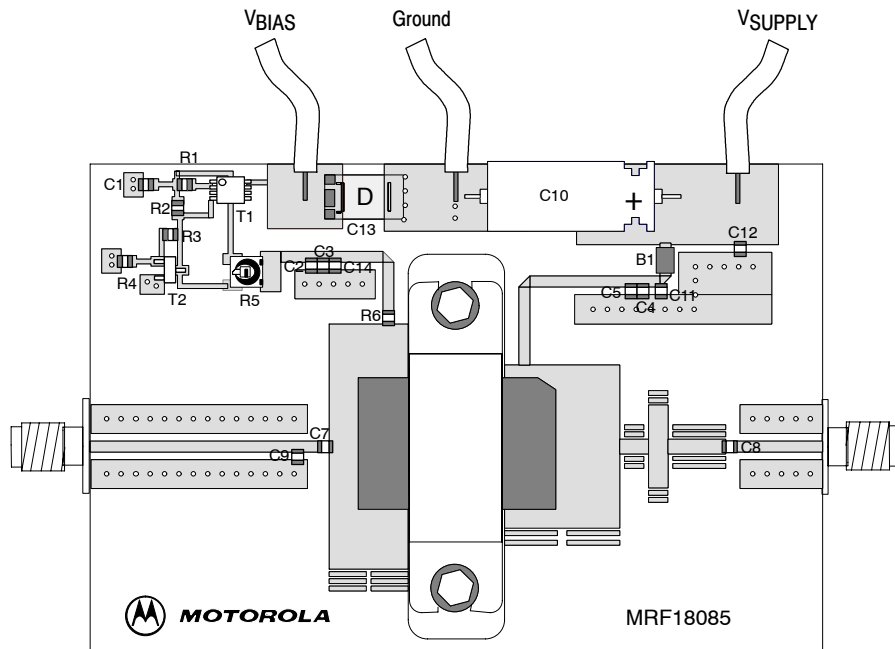


Figure 4. 1.93 - 1.99 GHz GSM EDGE Optimized Demo Board Component Layout

## TYPICAL CHARACTERISTICS (Performed on a GSM EDGE Optimized Demo Board)

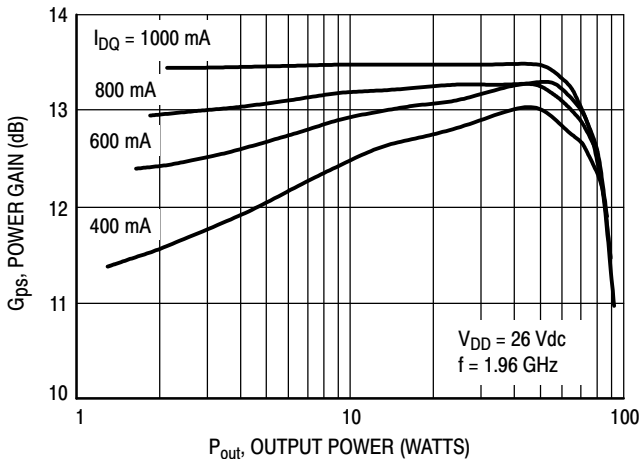


Figure 5. Power Gain versus Output Power

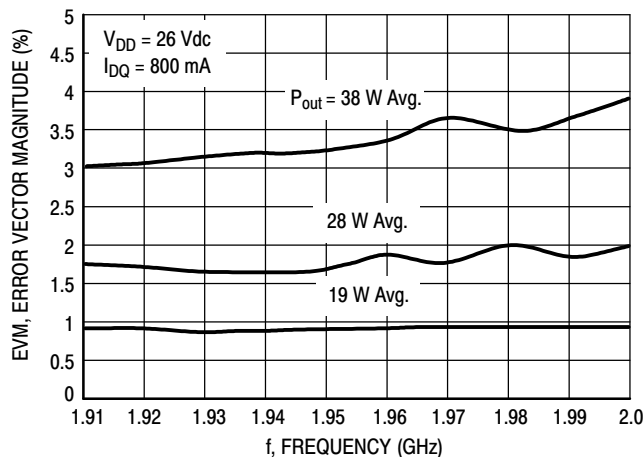


Figure 6. Error Vector Magnitude versus Frequency

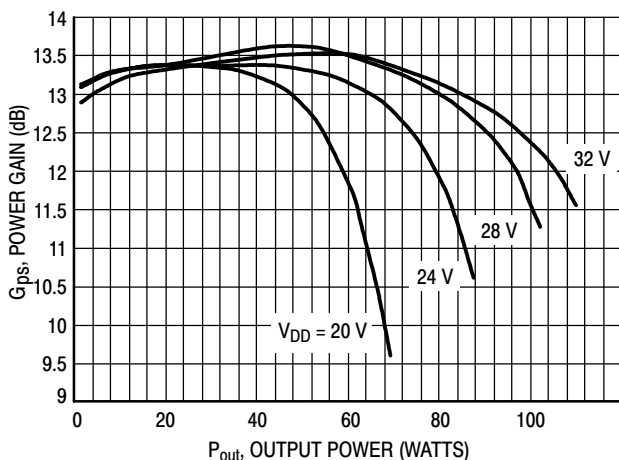


Figure 7. Power Gain versus Output Power

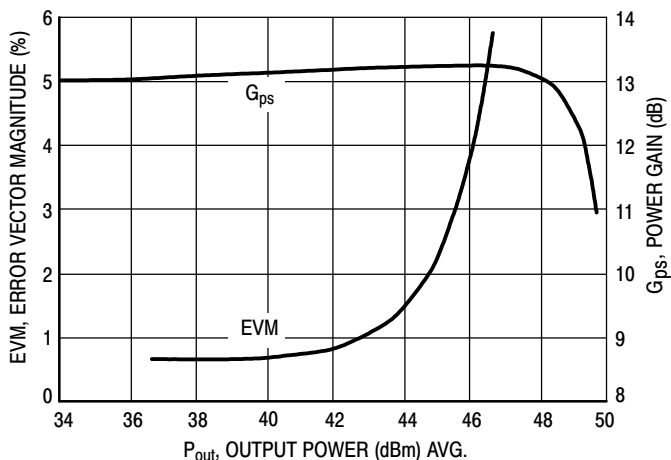


Figure 8. EVM and Gain versus Output Power

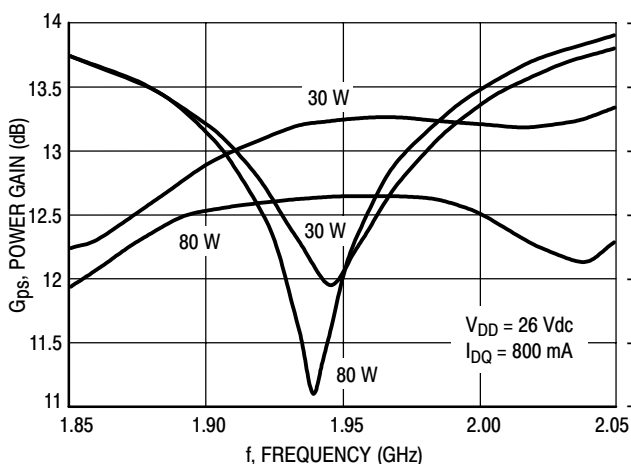


Figure 9. Power Gain and IRL versus Frequency

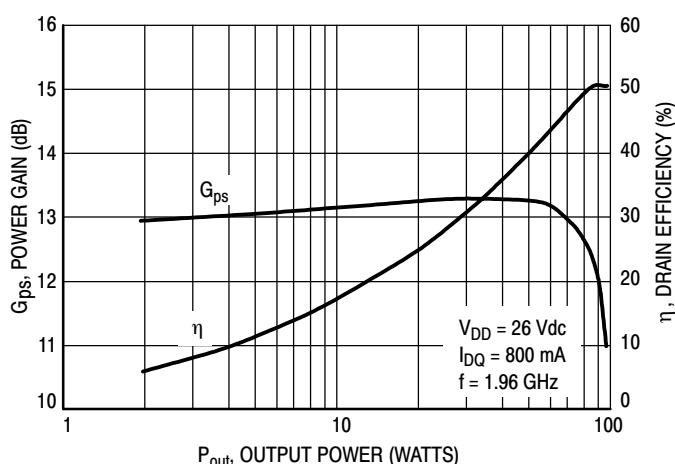
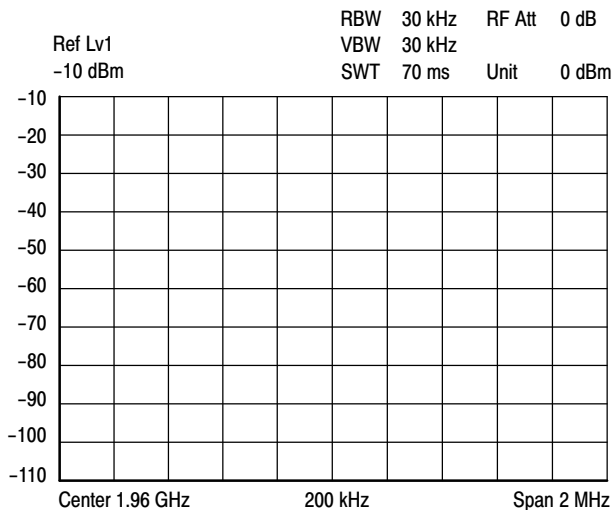


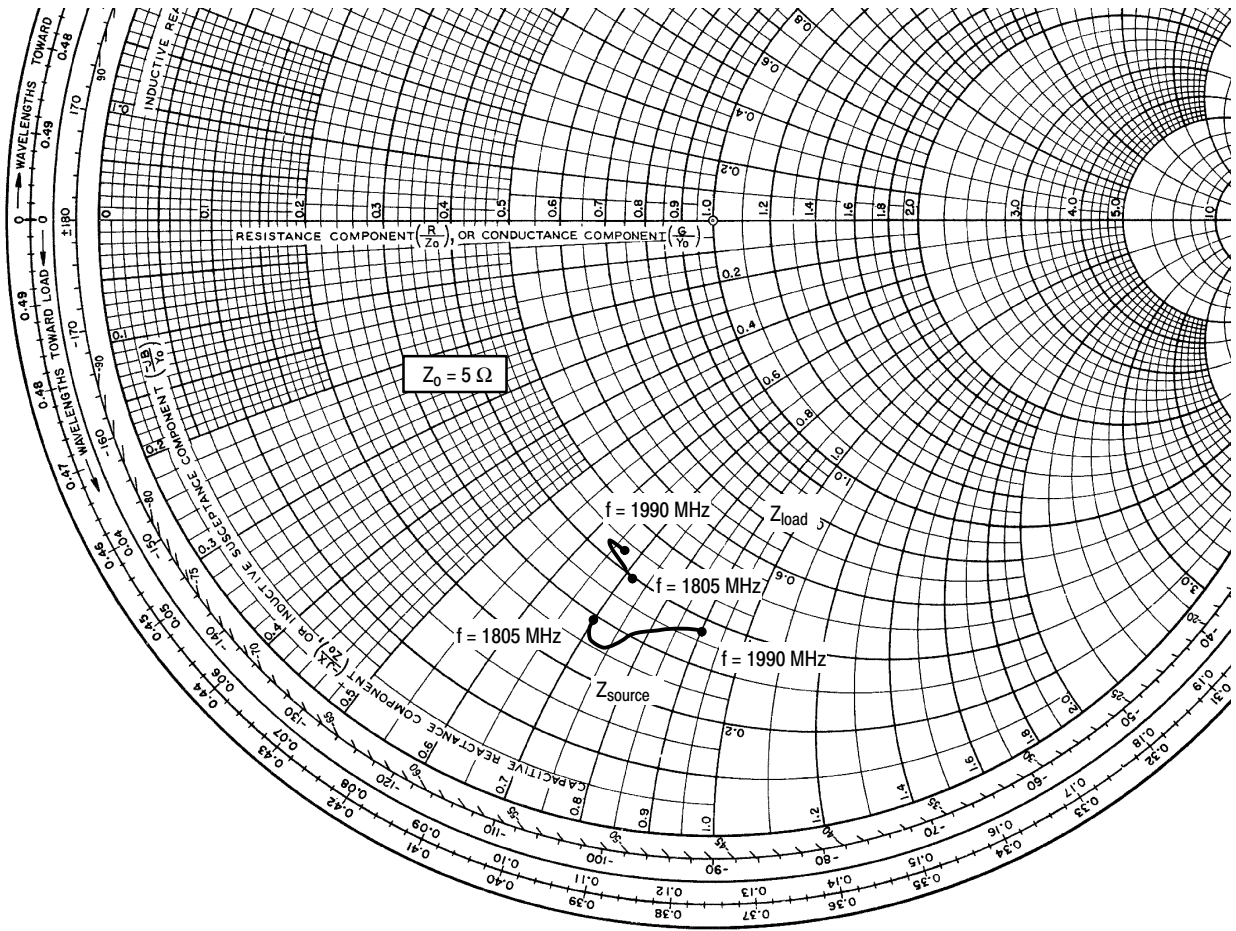
Figure 10. Power Gain and Efficiency versus Output Power

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## TYPICAL CHARACTERISTICS (Performed on a GSM EDGE Optimized Demo Board)



**Figure 11. EDGE Spectrum at 40 Watts (Avg.) Output Power**



$V_{DD} = 26\text{ V}$ ,  $I_{DQ} = 800\text{ mA}$ ,  $P_{out} = 85\text{ W CW}$

f MHz	Z <sub>source</sub> Ω	Z <sub>load</sub> Ω
1805	1.43 - j3.74	2 - j3.60
1880	1.27 - j3.95	1.98 - j3.57
1930	1.5 - j4.13	2.13 - j3.16
1990	1.86 - j4.76	2.17 - j3.36

Z<sub>source</sub> = Test circuit impedance as measured from gate to ground.

Z<sub>load</sub> = Test circuit impedance as measured from drain to ground.

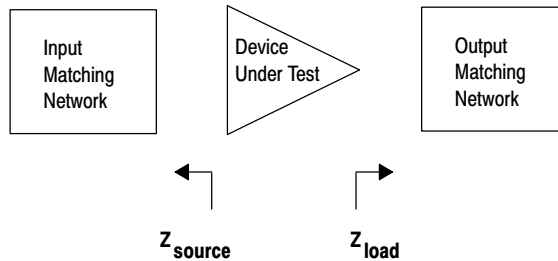


Figure 12. Series Equivalent Input and Output Impedance

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# NOTES

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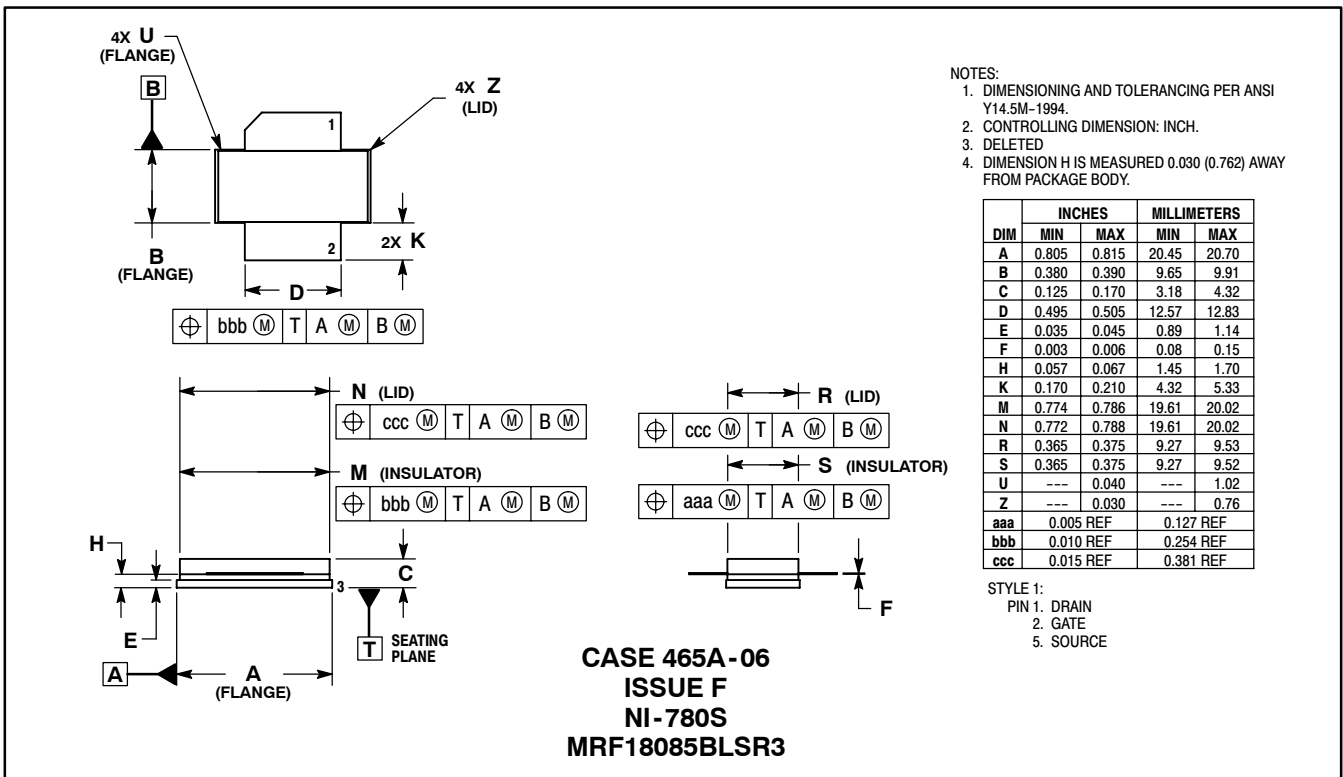
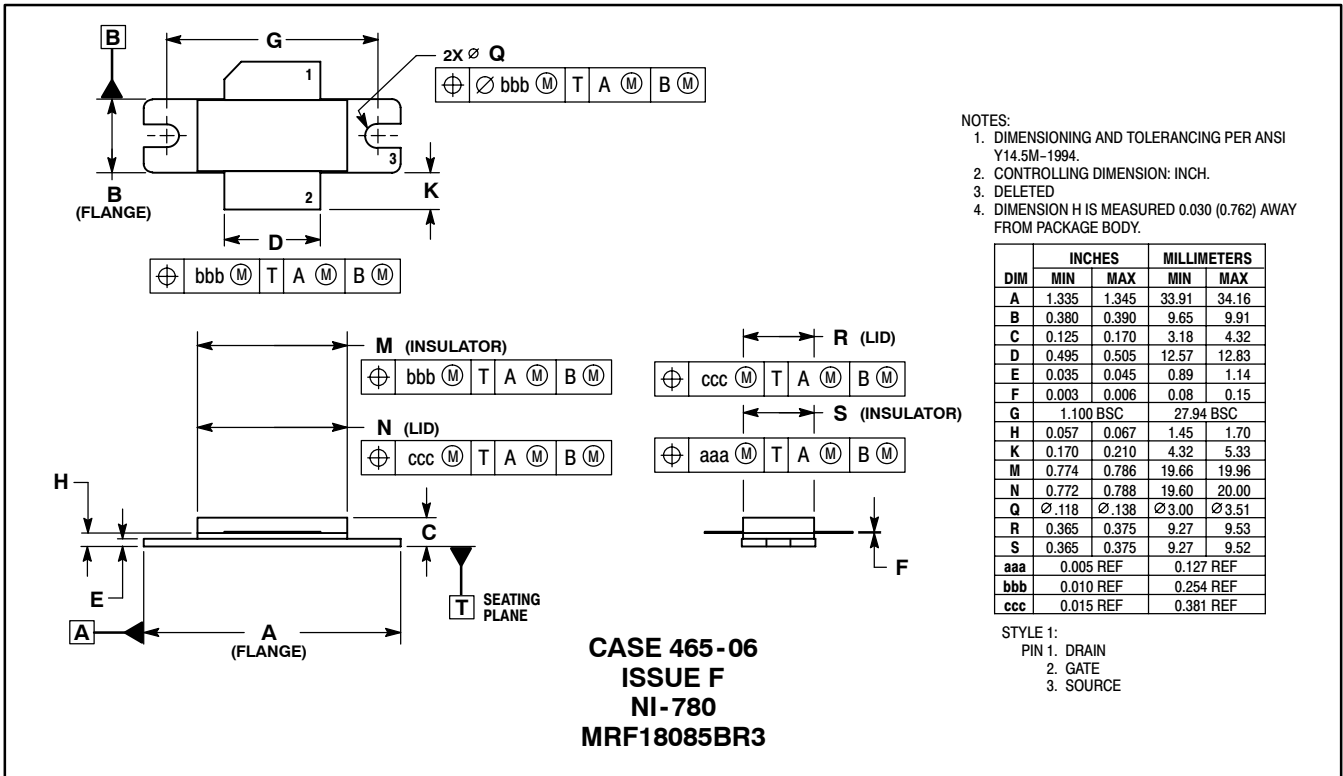


**NOTES**

**NOTES**

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