Freescale Semiconductor
Technical Data

Document Number: MRF18085A-2
Rev. 8, 10/2008

RoHS

RF Power Field Effect Transistor

N-Channel Enhancement-Mode Lateral MOSFET

MRF18085ALSR3

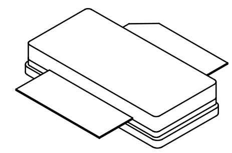
1805-1880 MHz, 85 W, 26 V
GSM/GSM EDGE
LATERAL N-CHANNEL
RF POWER MOSFET

Designed for GSM and GSM EDGE base station applications with frequencies from 1800 to 2000 MHz. Suitable for TDMA, CDMA and multicarrier amplifier applications. To be used in Class AB for PCN-PCS/cellular radio and WLL applications.

- GSM and GSM EDGE Performance @ 1880 MHz
  Power Gain - 15 dB (Typ) @ 85 Watts CW
  Efficiency - 52% (Typ) @ 85 Watts CW
- Capable of Handling 5:1 VSWR, @ 26 Vdc, 1840 MHz, 85 Watts CW Output Power

Features

- Internally Matched for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Designed for Maximum Gain and Insertion Phase Flatness
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters
- Available with Low Gold Plating Thickness on Leads. L Suffix Indicates 40μ″ Nominal.
- RoHS Compliant
- In Tape and Reel. R3 Suffix = 250 Units per 56 mm, 13 inch Reel.



CASE 465A-06, STYLE 1
NI-780S

Table 1. Maximum Ratings

Rating	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-0.5, +65	Vdc
Gate-Source Voltage	V_{GS}	-0.5, +15	Vdc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	273 1.56	W W/°C
Storage Temperature Range	T_{stg}	- 65 to +150	°C
Case Operating Temperature	T_C	150	°C
Operating Junction Temperature	T_J	200	°C

Table 2. Thermal Characteristics

Characteristic	Symbol	Value (1)	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.79	°C/W

Table 3. ESD Protection Characteristics

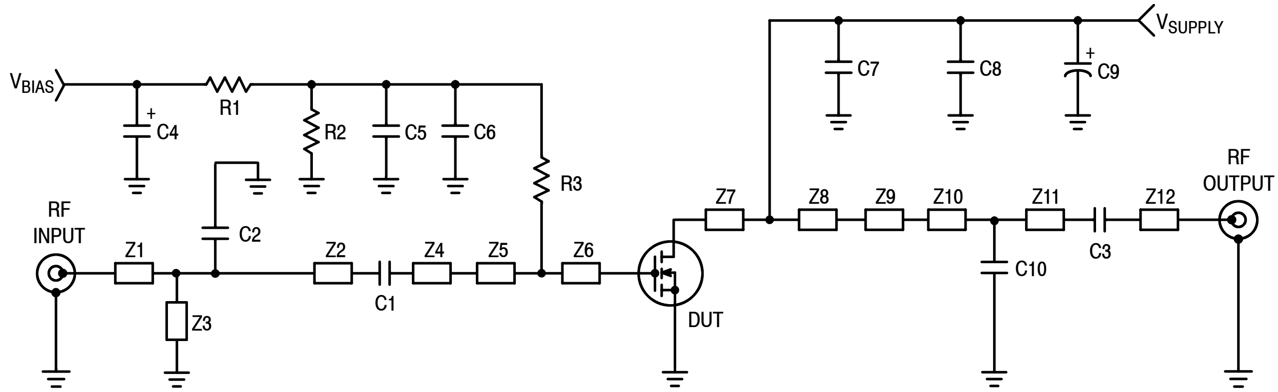
Test Conditions	Class
Human Body Model	1 (Minimum)
Machine Model	M3 (Minimum)

1. Refer to AN1955/D, *Thermal Measurement Methodology of RF Power Amplifiers.* Go to http://www.freescale.com/rf. Select Documentation/Application Notes - AN1955.

Table 4. Electrical Characteristics (T_C = 25°C unless otherwise noted)

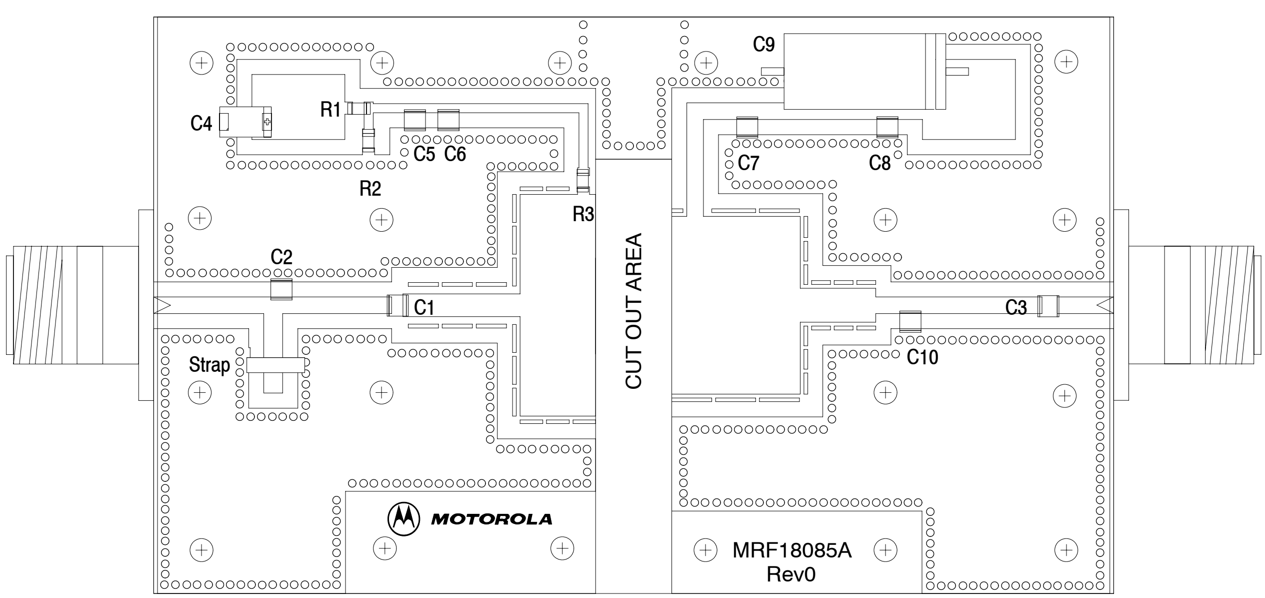
Characteristic	Symbol	Min	Typ	Max	Unit
Off Characteristics					
Drain-Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 100 μAdc)	$V_{(BR)DSS}$	65	—	—	Vdc
Zero Gate Voltage Drain Current (V_{DS} = 26 Vdc, V_{GS} = 0 Vdc)	I_{DSS}	—	—	10	μAdc
Gate-Source Leakage Current (V_{GS} = 5 Vdc, V_{DS} = 0 Vdc)	I_{GSS}	—	—	1	μAdc
On Characteristics					
Gate Threshold Voltage (V_{DS} = 10 Vdc, I_D = 200 μAdc)	$V_{GS(th)}$	2	—	4	Vdc
Gate Quiescent Voltage (V_{DS} = 26 Vdc, I_D = 600 mAdc)	$V_{GS(Q)}$	2.5	3.9	4.5	Vdc
Drain-Source On-Voltage (V_{GS} = 10 Vdc, I_D = 2 Adc)	$V_{DS(on)}$	—	0.15	—	Vdc
Dynamic Characteristics					
Reverse Transfer Capacitance (1) (V_{DS} = 26 Vdc, V_{GS} = 0, f = 1 MHz)	C_{rss}	—	3.6	—	pF
Functional Tests (In Freescale Test Fixture, 50 ohm system)					
Common-Source Amplifier Power Gain @ 85 W (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1880 MHz)	G_{ps}	13.5	15	—	dB
Drain Efficiency @ 85 W (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1880 MHz)	η	48	52	—	%
Input Return Loss @ 85 W (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1880 MHz)	IRL	—	-12	-9	dB
Power Output, 1 dB Compression Point (V_{DD} = 26 Vdc, I_{DQ} = 800 mA, f = 1880 MHz)	P1dB	83	90	—	Watts

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



C1, C3, C6, C7	10 pF Chip Capacitors, ATC	Z4	0.610″ x 00.118″ Microstrip
C2	1.8 pF Chip Capacitor, ATC	Z5	0.331″ x 1.153″ Microstrip
C4	10 μF, 35 V Tantalum Capacitor, AVX	Z6	0.063″ x 1.153″ Microstrip
C5, C8	1 nF Chip Capacitors, ATC	Z7	0.122″ x 0.925″ Microstrip
C9	220 μF, 63 V Electrolytic Capacitor, Radial, Philips	Z8	0.547″ x 0.925″ Microstrip
C10	0.3 pF Chip Capacitor, ATC	Z9	0.394″ x 0.177″ Microstrip
R1, R2	10 kΩ, 1/4 W Chip Resistors (1206)	Z10	0.180″ x 0.087″ Microstrip
R3	1.0 kΩ, 1/4 W Chip Resistor (1206)	Z11	0.686″ x 0.087″ Microstrip
Z1	0.671″ x 0.087″ Microstrip	Z12	0.294″ x 0.087″ Microstrip
Z2	0.568″ x 0.087″ Microstrip	PCB	Taconic TLX8, 30 mils, ε_r = 2.55
Z3	0.500″ x 0.098″ Microstrip Shorted Stub		

Figure 1. 1805-1880 MHz Test Fixture Schematic



Freescale has begun the transition of marking Printed Circuit Boards (PCBs) with the Freescale Semiconductor signature/-logo. PCBs may have either Motorola or Freescale markings during the transition period. These changes will have no impact on form, fit or function of the current product.

Figure 2. 1805-1880 MHz Test Fixture Component Layout

TYPICAL CHARACTERISTICS

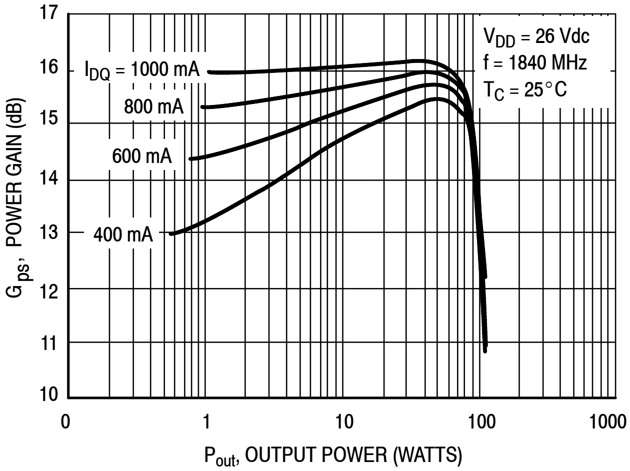


Figure 3. Power Gain versus Output Power

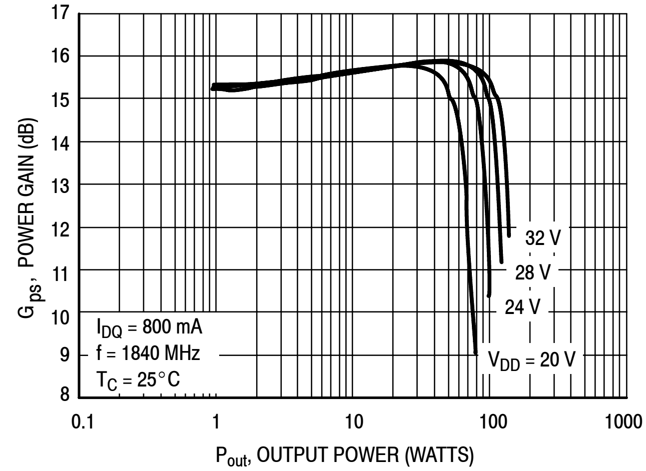


Figure 4. Power Gain versus Output Power

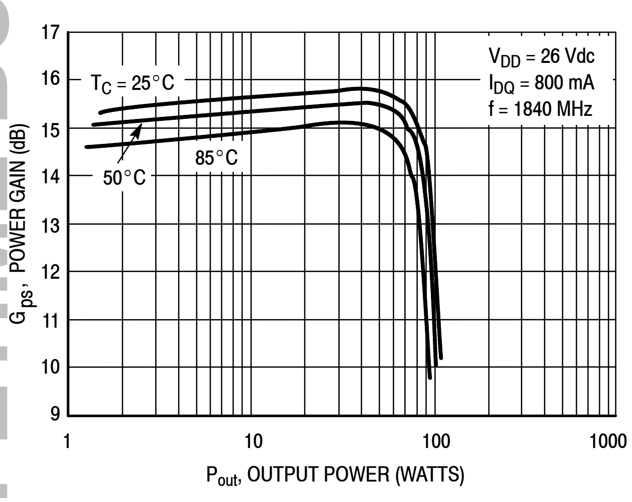


Figure 5. Power Gain versus Output Power

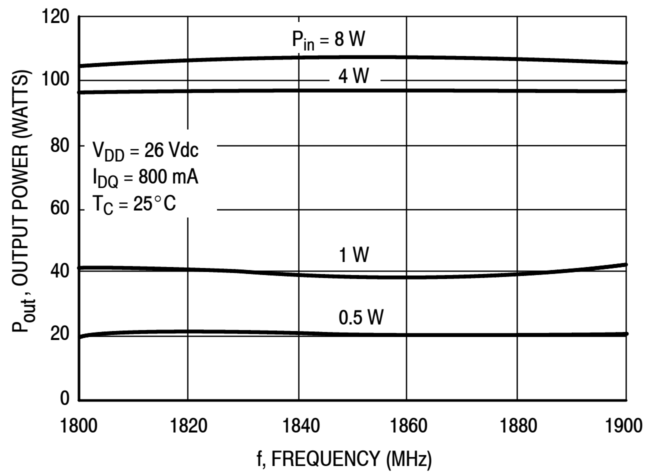


Figure 6. Output Power versus Frequency

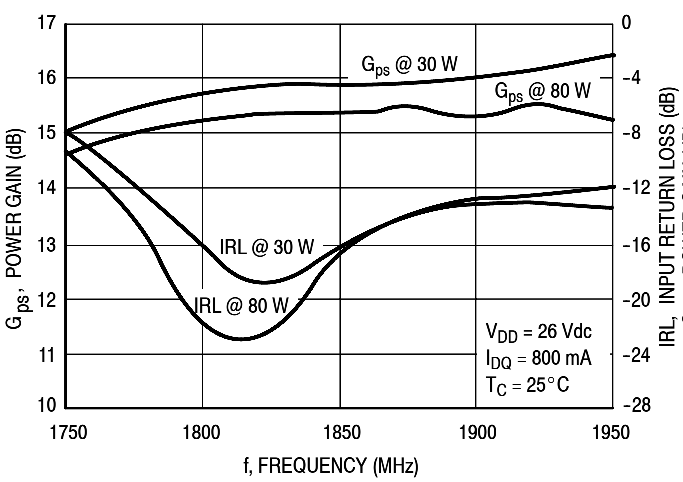


Figure 7. Power Gain versus Frequency

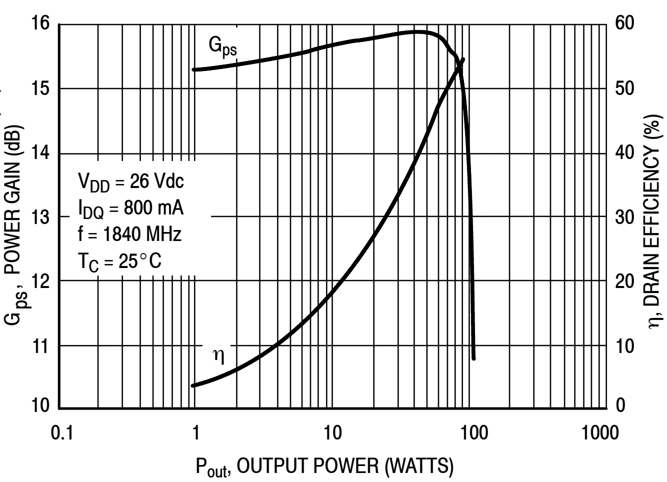
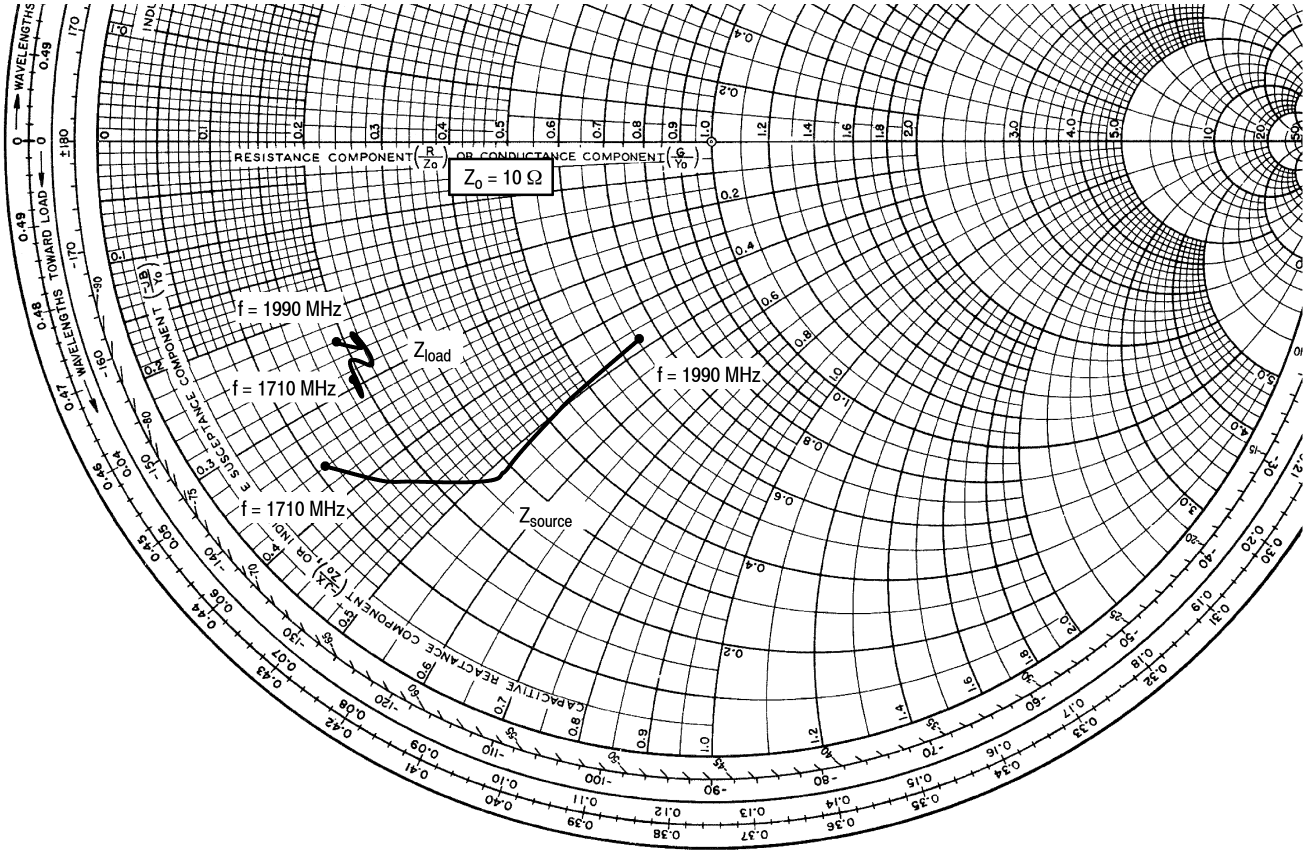


Figure 8. Power Gain and Efficiency versus Output Power



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

f MHz	Z_{source} Ω	Z_{load} Ω
1710	1.13 – j3.62	1.79 – j2.88
1785	1.61 – j4.23	1.82 – j3.15
1805	1.69 – j4.34	1.90 – j2.66
1880	2.83 – j5.25	2.09 – j2.77
1930	3.00 – j5.18	2.01 – j2.44
1960	4.39 – j4.97	2.01 – j2.57
1990	6.59 – j4.74	1.79 – j2.37

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

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

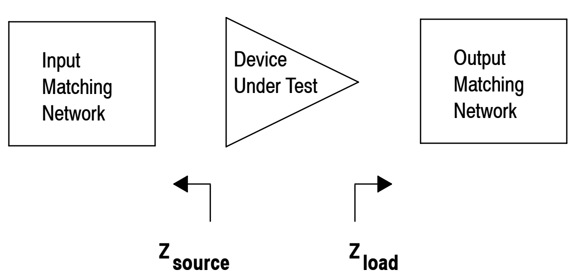
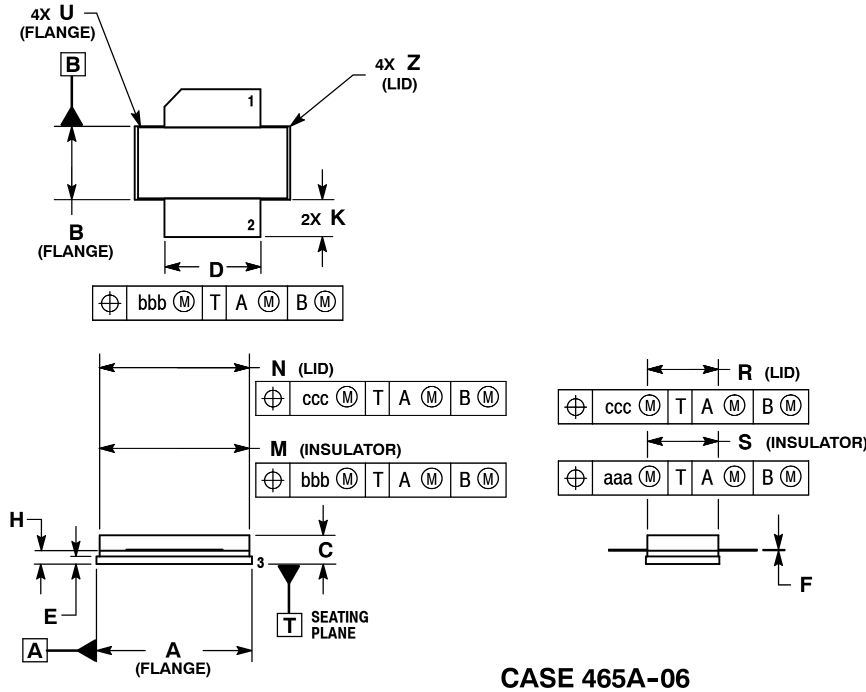


Figure 9. Series Equivalent Source and Load Impedance

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1994.
2. CONTROLLING DIMENSION: INCH.
3. DELETED
4. DIMENSION H IS MEASURED 0.030 (0.762) AWAY FROM PACKAGE BODY.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.805	0.815	20.45	20.70
B	0.380	0.390	9.65	9.91
C	0.125	0.170	3.18	4.32
D	0.495	0.505	12.57	12.83
E	0.035	0.045	0.89	1.14
F	0.003	0.006	0.08	0.15
H	0.057	0.067	1.45	1.70
K	0.170	0.210	4.32	5.33
M	0.774	0.786	19.61	20.02
N	0.772	0.788	19.61	20.02
R	0.365	0.375	9.27	9.53
S	0.365	0.375	9.27	9.52
U	---	0.040	---	1.02
Z	---	0.030	---	0.76
aaa	0.005 REF		0.127 REF	
bbb	0.010 REF		0.254 REF	
ccc	0.015 REF		0.381 REF	

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

CASE 465A-06
ISSUE H
NI-780S
MRF18085ALSR3

PRODUCT DOCUMENTATION

Refer to the following documents to aid your design process.

Application Notes

- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

Engineering Bulletins

- EB212: Using Data Sheet Impedances for RF LDMOS Devices

REVISION HISTORY

The following table summarizes revisions to this document.

Revision	Date	Description
8	Oct. 2008	• Data sheet revised to reflect part status change, p. 1, including use of applicable overlay. • Modified data sheet to reflect RF Test Reduction described in Product and Process Change Notification number, PCN12779, p. 1, 2 • Added Product Documentation and Revision History, p. 7 • Data sheet split due to change in part life cycle. See MRF18085A-1 Rev. 7 for MRF18085ALR3.

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor, Inc.
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 10 5879 8000
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or +1-303-675-2140
Fax: +1-303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

Document Number: MRF18085A-2
Rev. 8, 10/2008