

RF Reference Design Library

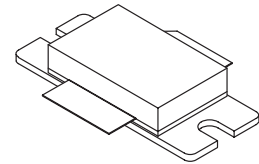
The RF MOSFET Line **RF Power Field Effect Transistors** N-Channel Enhancement-Mode Lateral MOSFETs

Designed for W-CDMA base station applications at frequencies from 2110 to 2170 MHz. Suitable for TDMA, CDMA and multicarrier amplifier applications. To be used in class AB for PCN-PCS/cellular radio and WLL applications.

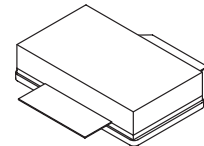
- 2-carrier W-CDMA Performance for $V_{DS} = 28$ Volts, $I_{DQ} = 1600$ mA, $f_1 = 2.1125$ GHz, $f_2 = 2.1225$ GHz, Channel bandwidth = 3.84 MHz, adjacent channels at ± 5 MHz, ACPR and IM3 measured in 3.84 MHz bandwidth. Peak/Avg = 8.5 dB @ 0.01% probability on CCDF.
 - Output Power — 20 Watts
 - Efficiency — 18%
 - Gain — 13 dB
 - IM3 — -40 dBc
 - ACPR — -45 dBc
- 100% Tested under 2-carrier W-CDMA
- Internally Matched for Ease of Use
- High Gain, High Efficiency and High Linearity
- Integrated ESD Protection
- Ease of Design for Gain and Insertion Phase Flatness
- Excellent Thermal Stability
- Characterized with Series Equivalent Large-Signal Impedance Parameters

MRF21125 Wideband CDMA

2170 MHz, 125 W, 28 V
LATERAL N-CHANNEL
BROADBAND
RF POWER MOSFETs



CASE 465B-02, STYLE 1
(MRF21125)



CASE 465C-01, STYLE 1
(MRF21125S)

MRF21125 REFERENCE DESIGN

Designed by: Long Nguyen, Antoine Rabany and John Kinney, Motorola SPS

REFERENCE DESIGN

This reference design is designed to demonstrate the RF performance characteristics of the MRF21125 when applied for the 2110 – 2170 MHz wideband CDMA frequency band. The reference design is tuned for performance at 20 watts average output power, $V_{DS} = 28$ volts, and $I_{DQ} = 1600$ mA.

REFERENCE DESIGN LIBRARY TERMS AND CONDITIONS

Motorola is pleased to make this reference design available for your use in development and testing of your own

product or products, without charge. The reference design contains easy-to-copy, fully functional amplifier designs. Where possible, it consists of “no tune” distributed element matching circuits designed to be as small as possible, includes temperature compensated bias circuitry, and is designed to be used as “building blocks” for our customers.

HEATSINKING

When operating this fixture please provide adequate heatsinking for the device. Excessive heating of the device will prevent repeating of the included measurements.



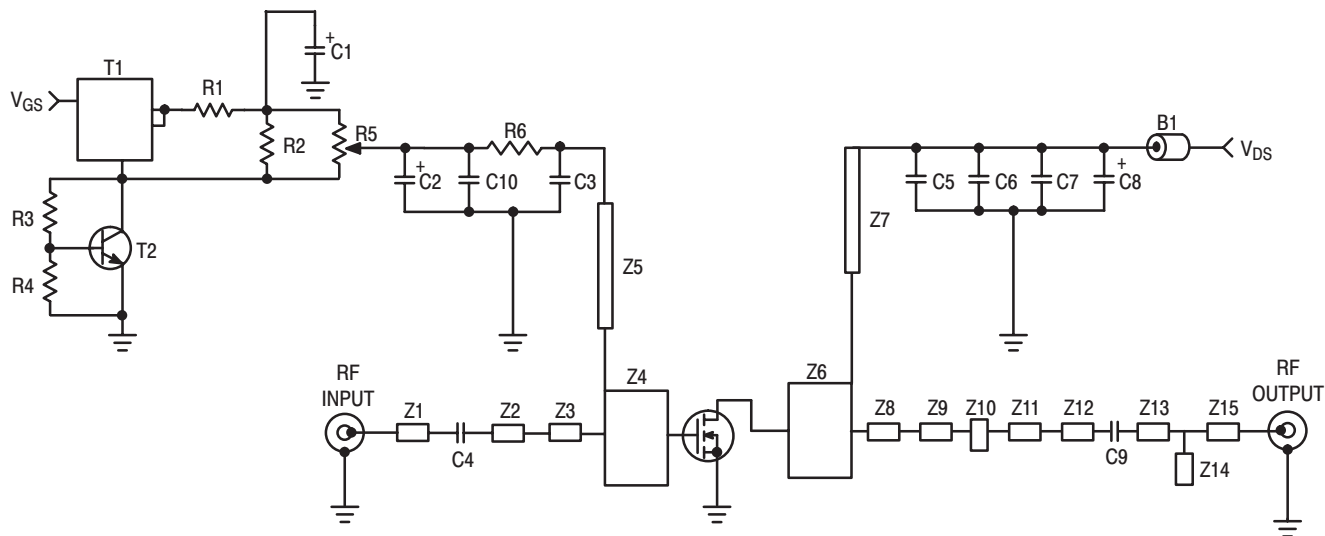


Figure 1. MRF21125 Wideband CDMA Reference Design Schematic

Table 1. MRF21125 Wideband CDMA Reference Design Component Designations and Values

Designation	Description
B1	Ferrite Bead, Fair Rite #2743019447
C1	1 μ F, 35 V Tantalum Chip Capacitor, Kemet
C2, C8	22 μ F, 35 V Tantalum Chip Capacitors, Kemet
C3	4.7 pF Chip Capacitor, ACCU-P (0805)
C4	10 pF Chip Capacitor, ACCU-P (0805)
C5	12 pF Chip Capacitor, ACCU-P (0805)
C6	0.01 μ F Chip Capacitor, B Case, ATC #200
C7, C10	0.1 μ F Chip Capacitors
C9	15 pF Chip Capacitor, ACCU-P (0805)
R1	10 Ω Chip Resistor (0805)
R2	1.0 k Ω Chip Resistor (0805)
R3	1.2 k Ω Chip Resistor (0805)
R4	2.2 k Ω Chip Resistor (0805)
R5	5.0 k Ω Potentiometer
R6	2.7 Ω , 1/4 W Chip Resistor (1206)
T1	Voltage Regulator, Micro-8 #LP2951
T2	NPN Bipolar Transistor, SOT-23 #BC847
Z1	7.08 x 1.09 mm Microstrip
Z2	12.38 x 1.09 mm Microstrip
Z3	1.91 x 8.57 mm Microstrip
Z4	5.63 x 14.27 mm Microstrip
Z5	13.36 x 1.11 mm Microstrip
Z6	9.61 x 20.78 mm Microstrip
Z7	4.16 x 1.11 mm Microstrip
Z8	3.18 x 16.51 mm Microstrip
Z9	1.43 x 3.0 mm Microstrip
Z10	2.42 x 6.88 mm Microstrip
Z11	2.00 x 1.20 mm Microstrip
Z12	3.40 x 1.09 mm Microstrip
Z13	4.28 x 1.09 mm Microstrip
Z14	1.09 x 2.29 mm Microstrip
Z15	0.84 x 1.09 mm Microstrip
Bedstead	Copper Heatsink
Raw PCB	0.020" Rogers 04350, 50 x 70 mm, n = 3.65

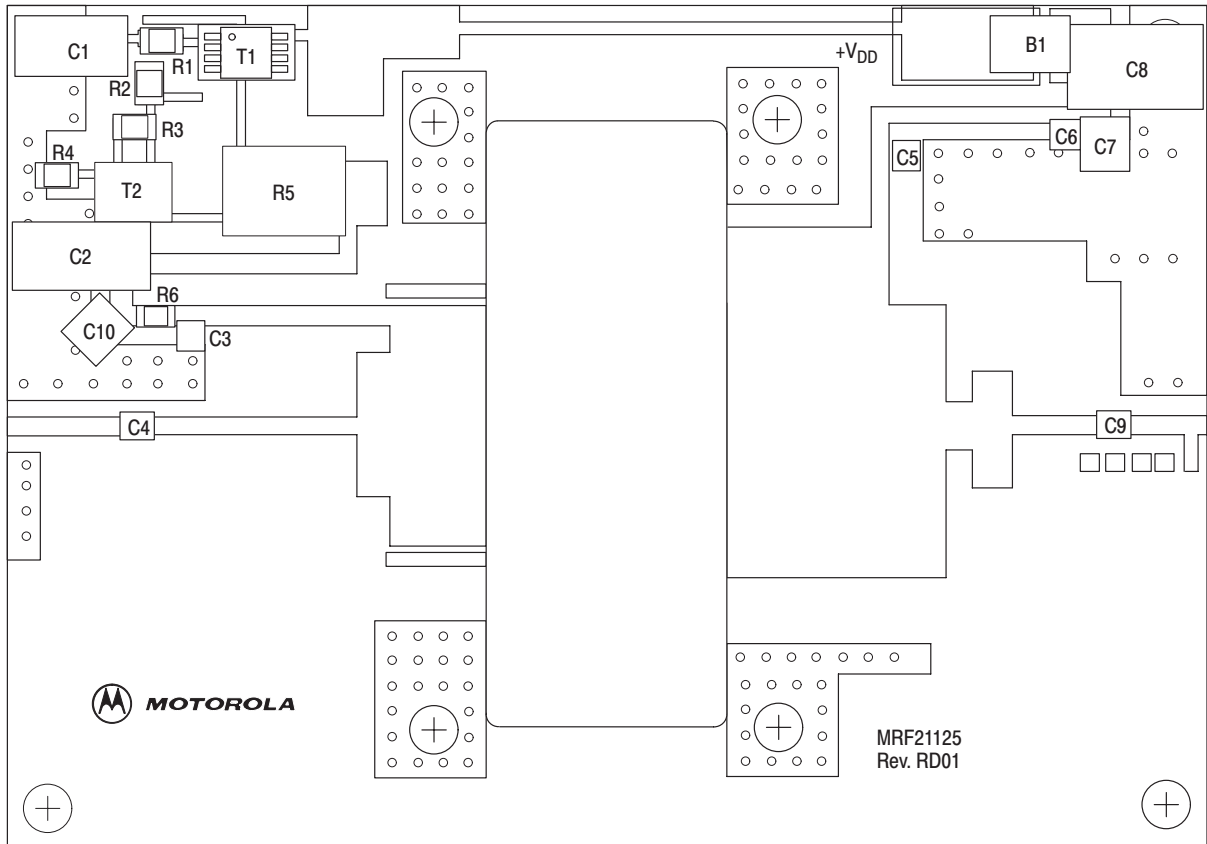


Figure 2. MRF21125 Wideband CDMA Reference Design PC Board Layout Diagram

CHARACTERISTICS

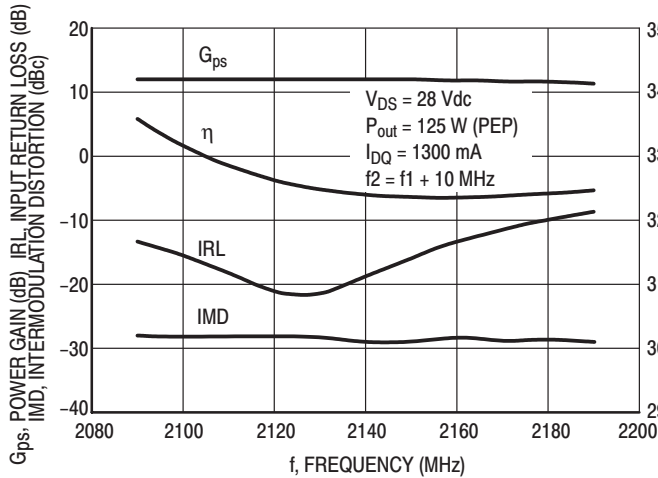


Figure 3. Broadband Performance @ 10 MHz Tone Spacing

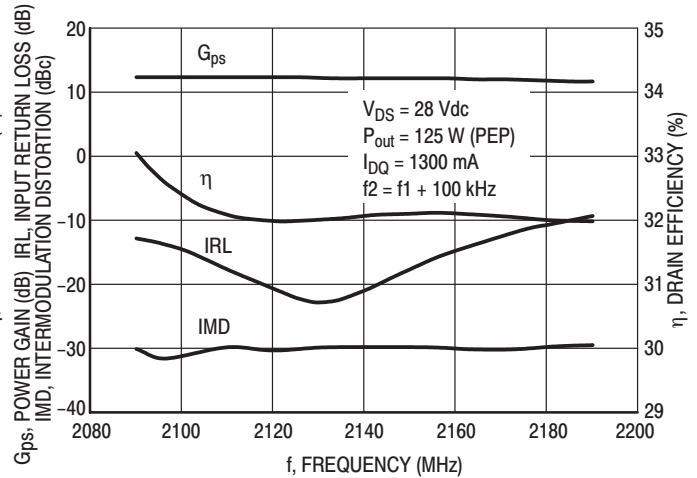


Figure 4. Broadband Performance @ 100 kHz Tone Spacing

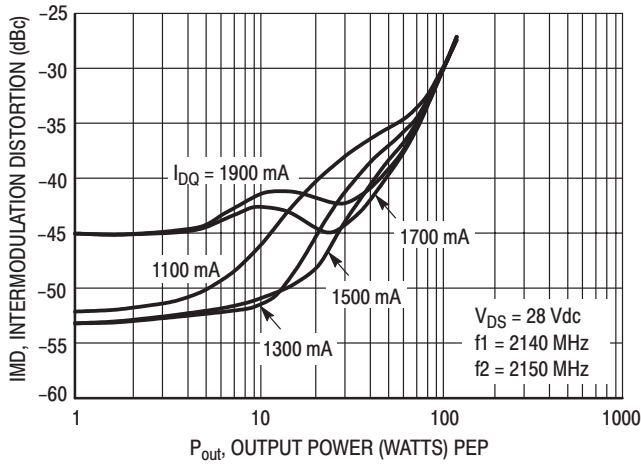


Figure 5. Intermodulation Performance with Increasing Quiescent Current @ 10 MHz Tone Spacing

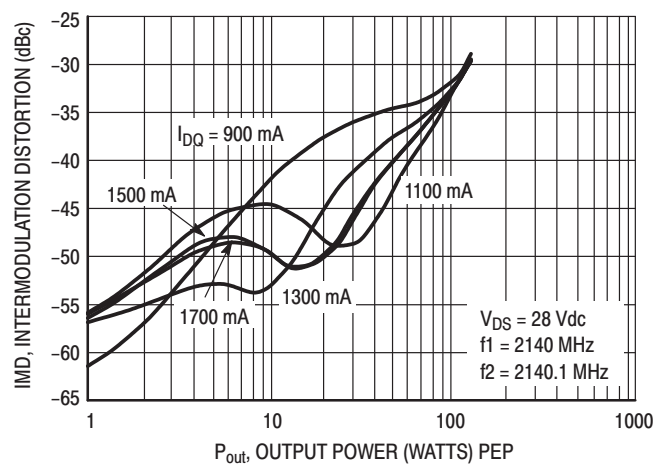


Figure 6. Intermodulation Performance with Increasing Quiescent Current @ 100 kHz Tone Spacing

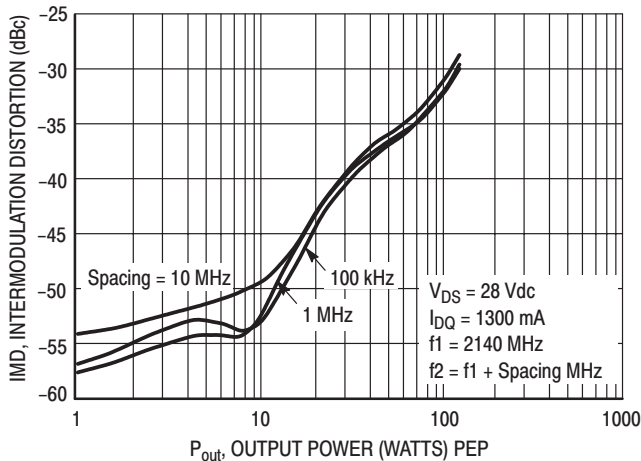


Figure 7. Intermodulation Performance with Increasing Carrier Spacing

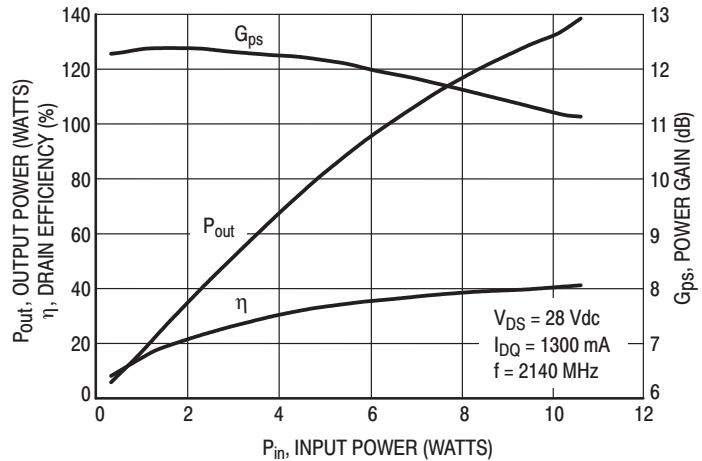


Figure 8. Single-Tone Output Power, Efficiency and Power Gain versus Input Power

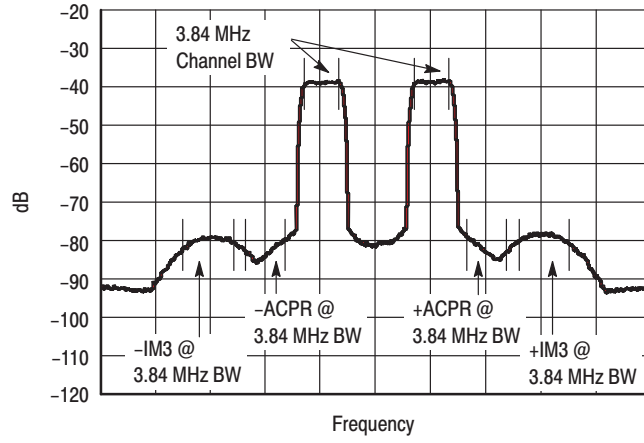



Figure 9. Two-Carrier Wideband CDMA Spectrum

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RDMRF21125WCDMA