The RF MOSFET Line

RF Power Field-Effect Transistor

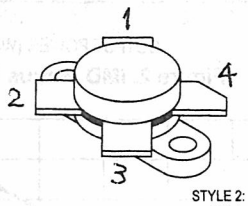
N–Channel Enhancement–Mode

MRF255

55 W, 12.5 Vdc, 54 MHz
N–CHANNEL
BROADBAND
RF POWER FET

Designed for broadband commercial and industrial applications at frequencies to 54 MHz. The high gain, broadband performance and linear characterization of this device makes it ideal for large–signal, common source amplifier applications in 12.5 Volt mobile and base station equipment.

- Guaranteed Performance at 54 MHz, 12.5 Volts
  - Output Power — 55 Watts PEP
  - Power Gain — 13 dB Min
  - Two–Tone IMD — –25 dBc Max
  - Efficiency — 40% Min, Two–Tone Test
- Characterized with Series Equivalent Large–Signal Impedance Parameters
- Excellent Thermal Stability
- All Gold Metal for Ultra Reliability
- Aluminum Nitride Package Electrical Insulator
- Circuit Board Photomaster Available by Ordering Document MRF255PHT/D from Motorola Literature Distribution.



CASE 211–11,

STYLE 2:
PIN 1. SOURCE
2. GATE
3. SOURCE
4. DRAIN

参考資料

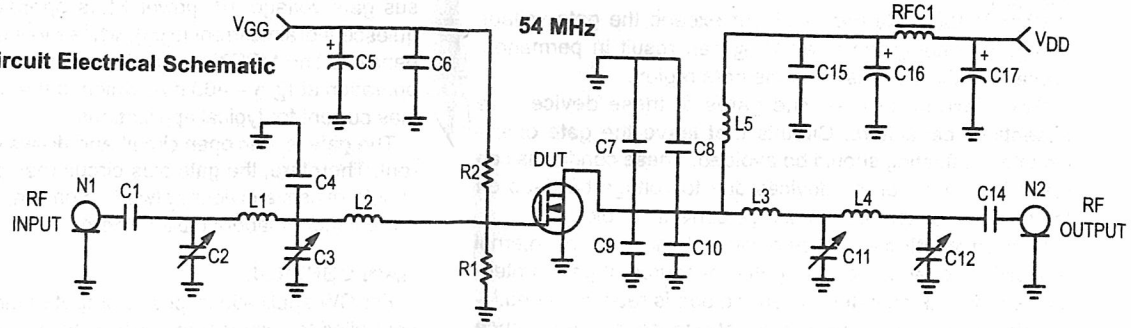
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain–Source Voltage	V_{DSS}	36	Vdc
Drain–Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	36	Vdc
Gate–Source Voltage	V_{GS}	±20	Vdc
Drain Current — Continuous	I_D	22	Adc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	175 1.0	Watts W/°C
Storage Temperature Range	T_{stg}	–65 to +150	°C
Operating Junction Temperature	T_J	200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	°C/W

Linear RF Test Circuit Electrical Schematic



C1 — 470 pF, Chip Capacitor
C2, C3, C11, C12 — 20–200 pF, Trimmer, ARCO #464
C4 — 100 pF, Chip Capacitor
C5, C17 — 100 µF, 15 V, Electrolytic
C6 — 0.001 µF, Disc Ceramic
C7, C8, C9, C10 — 330 pF, Chip Capacitor
C14 — 1200 pF, ATC Chip Capacitor
C15 — 910 pF, 500 V, Dipped Mica
C16 — 47 µF, 16 V, Electrolytic

L1 — 8 Turns, #20 AWG, 0.126″ ID
L2 — 5 Turns, #18 AWG, 0.142″ ID
L3 — 3 Turns, #20 AWG, 0.102″ ID
L4 — 7 Turns, #24 AWG, 0.070″ ID
L5 — 6.5 Turns, #18 AWG, 0.230″ ID, 0.5″ Long
N1, N2 — Type N Flange Mount
RFC1 — Ferroxcube VK–200–19/4B
R1 — 39 kΩ, 1/4 W Carbon
R2 — 150 Ω, 1/4 W Carbon
Board — G–10 .060″

TYPICAL CHARACTERISTICS

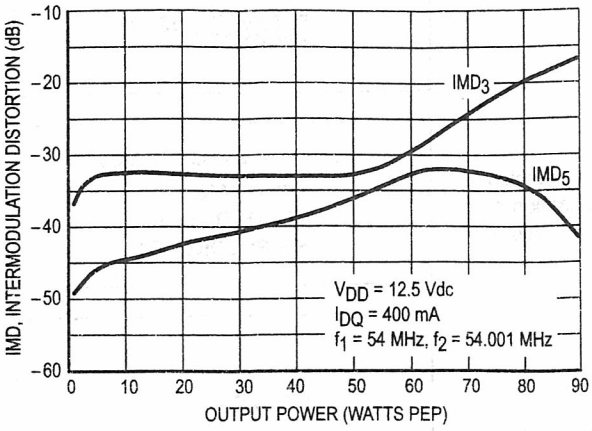


Figure 2. IMD versus Output Power

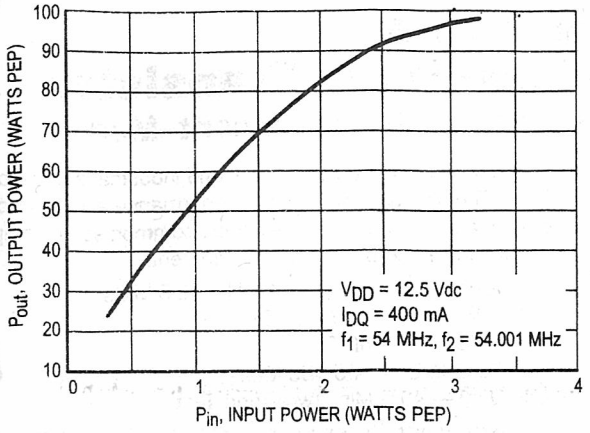
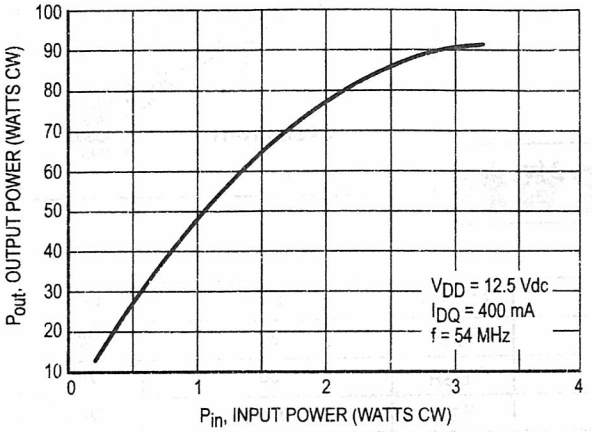


Figure 3. Output Power versus Input Power



Output Power versus Input Power

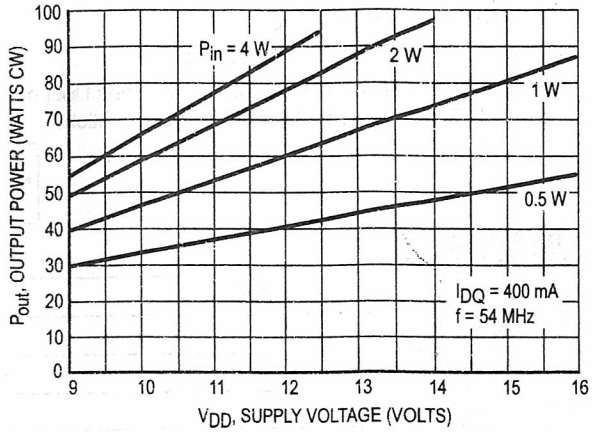


Figure 5. Output Power versus Supply Voltage

GATE CHARACTERISTICS

The gate of the RF MOSFET is a polysilicon material, and is electrically isolated from the source by a layer of oxide. The input resistance is very high — on the order of 10^9 ohms — resulting in a leakage current of a few nanoamperes.

Gate control is achieved by applying a positive voltage to the gate greater than the gate–to–source threshold voltage, $V_{GS(th)}$.

Gate Voltage Rating — Never exceed the gate voltage rating. Exceeding the rated V_{GS} can result in permanent damage to the oxide layer in the gate region.

Gate Termination — The gates of these devices are essentially capacitors. Circuits that leave the gate open–circuited or floating should be avoided. These conditions can result in turn–on of the devices due to voltage build–up on the input capacitor due to leakage currents or pickup.

Gate Protection — These devices do not have an internal monolithic zener diode from gate–to–source. If gate protection is required, an external zener diode is recommended.

Using a resistor to keep the gate–to–source impedance low also helps damp transients and serves another important function. Voltage transients on the drain can be coupled to the gate through the parasitic gate–drain capacitance. If the gate–to–source impedance and the rate of voltage change on the drain are both high, then the signal coupled to the gate may be large enough to exceed the gate–threshold voltage and turn the device on.

DC BIAS

Since the MRF255 is an enhancement mode FET, drain current flows only when the gate is at a higher potential than the source. See Figure 8 for a typial plot of drain current versus gate voltage. RF power FETs operate optimally with a quiescent drain current (I_{DQ}), whose value is application dependent. The MRF255 was characterized for linear and CW operation at I_{DQ} = 400 mA, which is the suggested value of bias current for typical applications.

The gate is a dc open circuit and draws essentially no current. Therefore, the gate bias circuit may generally be just a simple resistive divider network. Some applications may require a more elaborate bias sytem.

GAIN CONTROL

For CW applications, power output of the MRF255 may be controlled to some degree with a low power dc control signal applied to the gate, thus facilitating applications such as manual gain control, AGC/ALC and modulation systems. The characteristic is very dependent on frequency and load line.

参考資料