



PD54003 - PD54003S

RF POWER TRANSISTORS

The *LdmoST* Plastic FAMILY

PRELIMINARY DATA

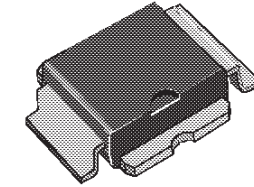
N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- POUT = 3 W with 12 dB gain @ 500 MHz / 7.5V
- NEW RF PLASTIC PACKAGE

DESCRIPTION

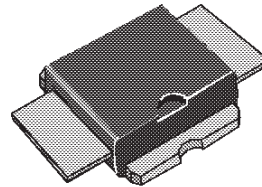
The PD5400 is a common source N-Channel, enhancement-mode, lateral Field-Effect RF power transistor. It is designed for high gain, broad band commercial and industrial applications. It operates at 7V in common source mode at frequencies of up to 1GHz. PD54003 boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, PowerSO-10RF. PD54003's superior linearity performance makes it an ideal solution for portable radio.

The PowerSO-10 plastic package, designed to offer high reliability, is the first ST JEDEC approved, high power SMD package. It has been specially optimized for RF needs and offers excellent RF performances and ease of assembly.



PowerSO-10RF
(Formed Lead)

| | |
|------------|----------|
| ORDER CODE | BRANDING |
| PD54003 | XPD54003 |



PowerSO-10RF
(Straight Lead)

| | |
|------------|-----------|
| ORDER CODE | BRANDING |
| PD54003S | XPD54003S |

ABSOLUTE MAXIMUM RATINGS (T_{CASE} = 25 °C)

| Symbol | Parameter | Value | Unit |
|----------------------|--|------------|------|
| V _{(BR)DSS} | Drain Source Voltage | 25 | V |
| V _{GS} | Gate-Source Voltage | ±20 | V |
| I _D | Drain Current | 4 | A |
| P _{DISS} | Power Dissipation (@ T _c = 70 °C) | 52.8 | W |
| T _j | Max. Operating Junction Temperature | 165 | °C |
| T _{STG} | Storage Temperature | -65 to 165 | °C |

THERMAL DATA

| | | | |
|----------------------|----------------------------------|-----|------|
| R _{th(j-c)} | Junction-Case Thermal Resistance | 1.8 | °C/W |
|----------------------|----------------------------------|-----|------|

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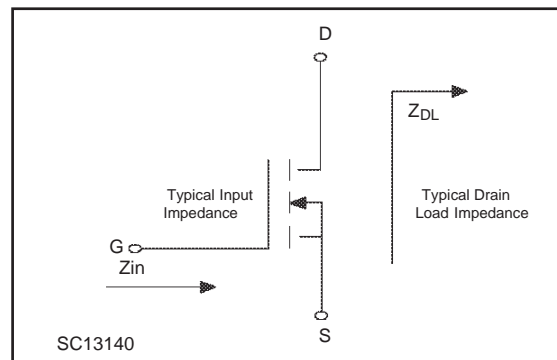
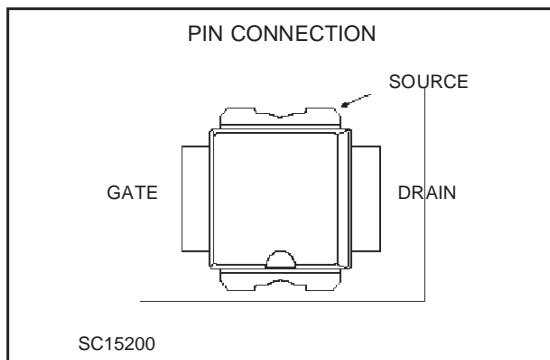
ELECTRICAL SPECIFICATION ($T_{CASE} = 25\text{ }^{\circ}\text{C}$)

STATIC

| Symbol | Parameter | | Min. | Typ. | Max. | Unit |
|--------------|------------------------|-------------------------|------|------|------|---------------|
| I_{DSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 25\text{ V}$ | | | 1 | μA |
| I_{GSS} | $V_{GS} = 20\text{ V}$ | $V_{DS} = 0\text{ V}$ | | | 1 | μA |
| $V_{GS(Q)}$ | $V_{DS} = 10\text{ V}$ | $I_D = 50\text{ mA}$ | 2.0 | | 5.0 | V |
| $V_{DS(ON)}$ | $V_{GS} = 10\text{ V}$ | $I_D = 1\text{ A}$ | | | 1.3 | V |
| g_{FS} | $V_{DS} = 10\text{ V}$ | $I_D = 1\text{ A}$ | | 1.5 | | mho |
| C_{ISS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 7.5\text{ V}$ | | 59 | | pF |
| C_{OSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 7.5\text{ V}$ | | 43 | | pF |
| C_{RSS} | $V_{GS} = 0\text{ V}$ | $V_{DS} = 7.5\text{ V}$ | | 4.0 | | pF |

DYNAMIC

| Symbol | Parameter | | Min. | Typ. | Max. | Unit |
|---------------|--|--|------|------|------|------|
| P_{OUT} | $f = 500\text{ MHz}$ | $V_{DD} = 7.5\text{ V}$ $I_{DQ} = 50\text{ mA}$ | 3 | | | W |
| G_{PS} | $f = 500\text{ MHz}$ | $V_{DD} = 7.5\text{ V}$ $P_{OUT} = 3\text{ W}$ $I_{DQ} = 50\text{ mA}$ | | 12 | | dB |
| η_D | $f = 500\text{ MHz}$ | $V_{DD} = 7.5\text{ V}$ $P_{OUT} = 3\text{ W}$ $I_{DQ} = 50\text{ mA}$ | | 55 | | % |
| LOAD Mismatch | $f = 500\text{ MHz}$ $V_{DD} = 9.5\text{ V}$ ALL PHASE ANGLES | $P_{OUT} = 3\text{ W}$ $I_{DQ} = 50\text{ mA}$ | 20:1 | | | VSWR |



IMPEDANCE DATA

PD54003

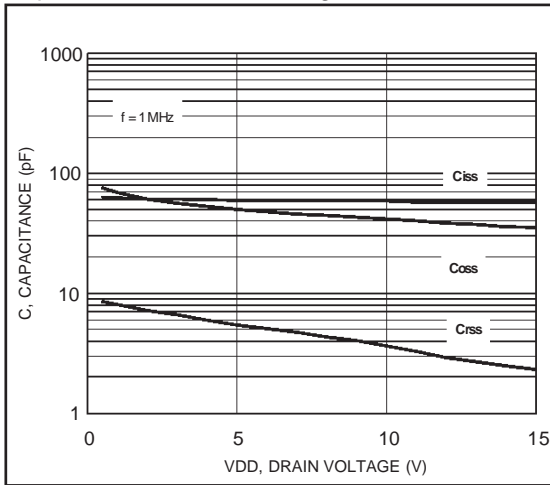
| Frequency MHz | Z_{in} Ω | Z_{dl} Ω |
|------------------|----------------------|----------------------|
| 520 | $1.993 - j1.098$ | $2.564 + j0.656$ |
| 500 | $1.553 - j1.251$ | $2.661 + j0.139$ |
| 480 | $2.245 - j0.077$ | $3.436 + j1.013$ |

PD54003S

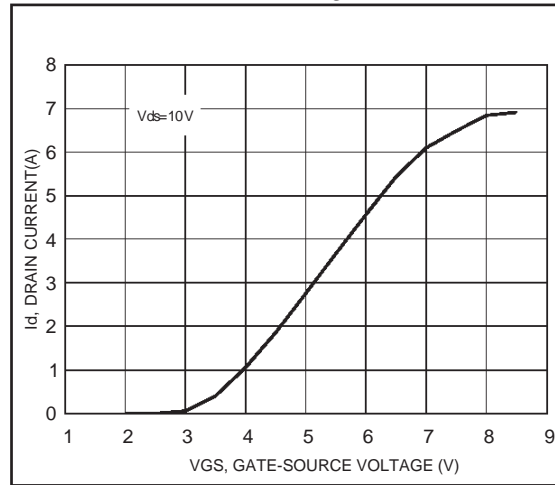
| Frequency MHz | Z_{in} Ω | Z_{dl} Ω |
|------------------|----------------------|----------------------|
| 520 | $1.534 - j2.104$ | $2.524 + j2.369$ |
| 500 | $1.209 - j2.451$ | $3.192 + j3.147$ |
| 480 | $1.400 - j3.986$ | $2.805 + j2.724$ |

TYPICAL PERFORMANCE

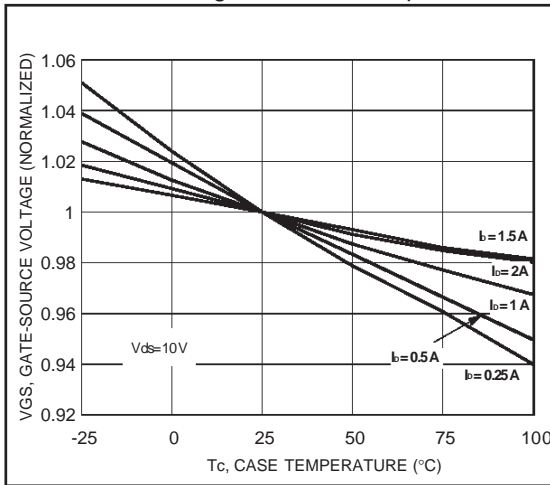
Capacitance vs. Drain Voltage



Drain Current vs. Gate Voltage



Gate-Source Voltage vs. Case Temperature

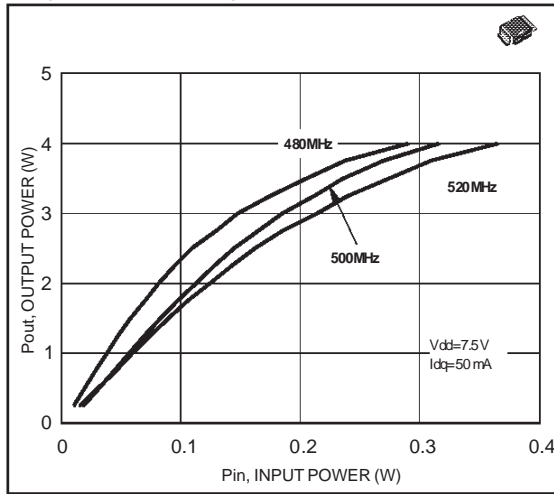


PD54003 - PD54003S

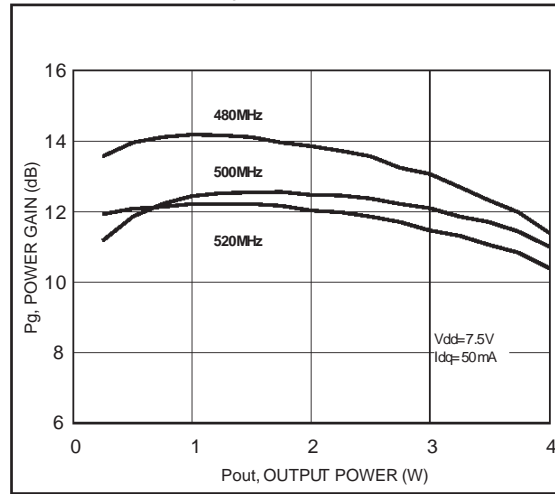
TYPICAL PERFORMANCE

Output Power vs. Input Power

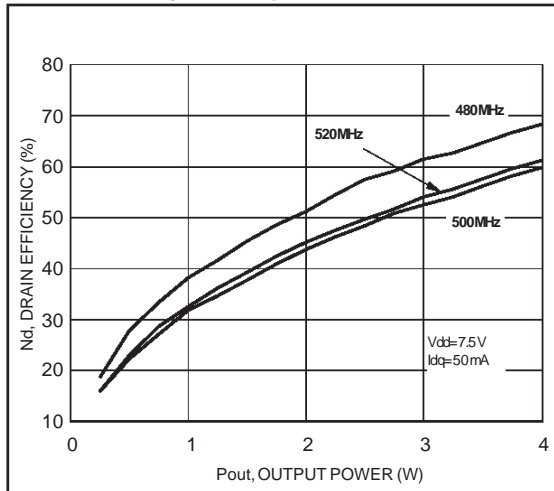
PD54003



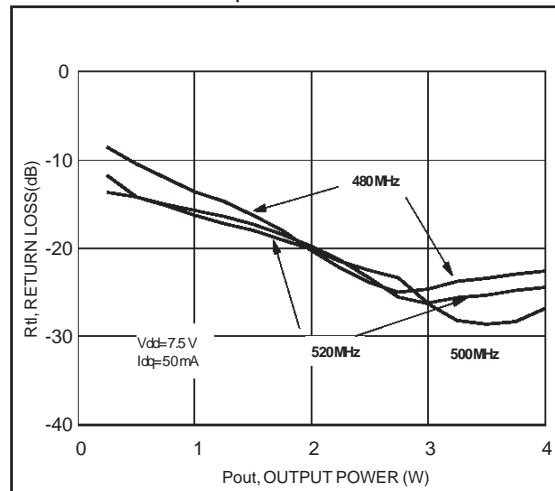
Power Gain vs. Output Power



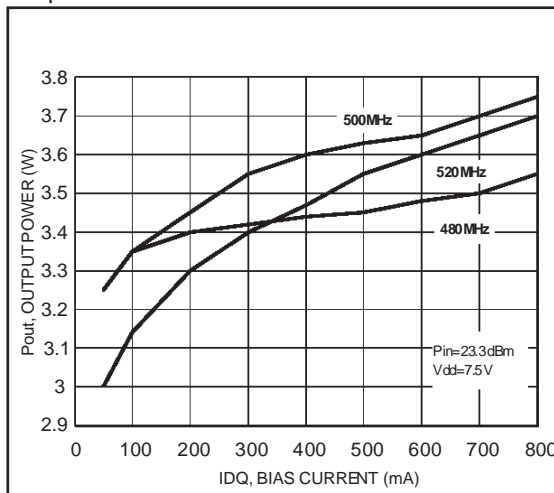
Drain Efficiency vs. Output Power



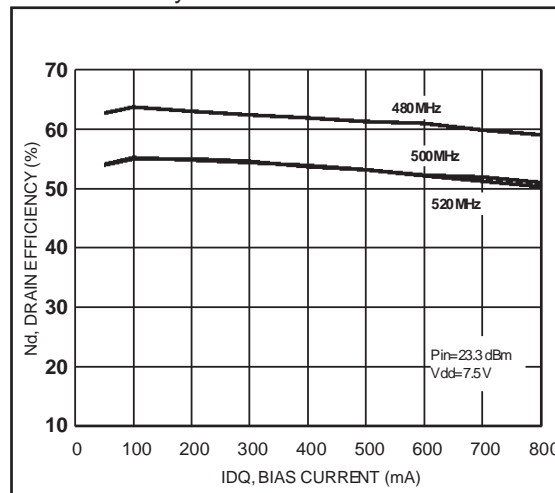
Return Loss vs. Output Power



Output Power vs. Bias Current

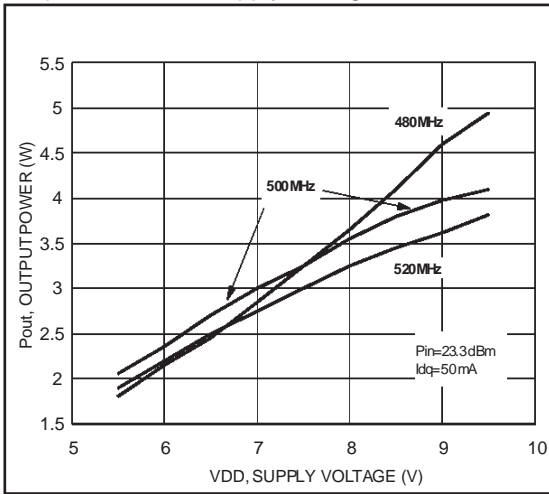


Drain Efficiency vs. Bias Current

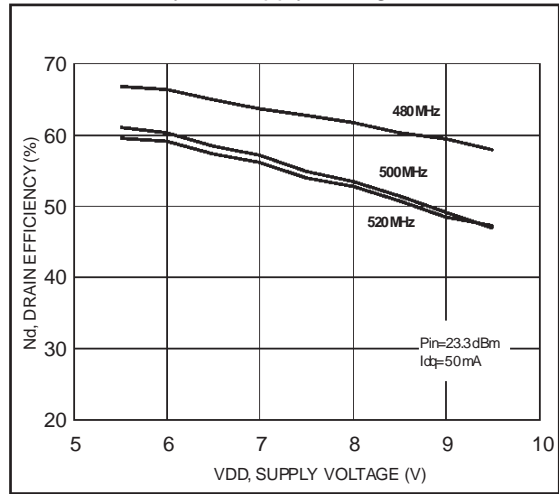


TYPICAL PERFORMANCE

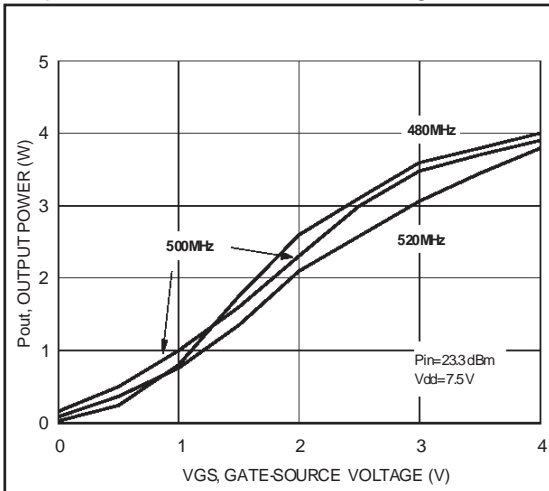
Output Power vs. Supply Voltage



Drain Efficiency vs. Supply Voltage

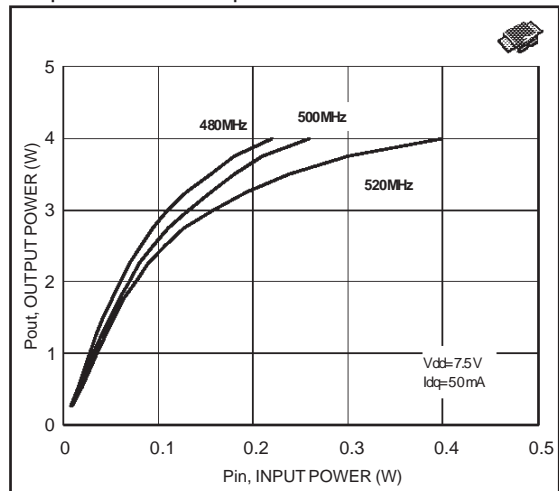


Output Power vs. Gate-Source Voltage

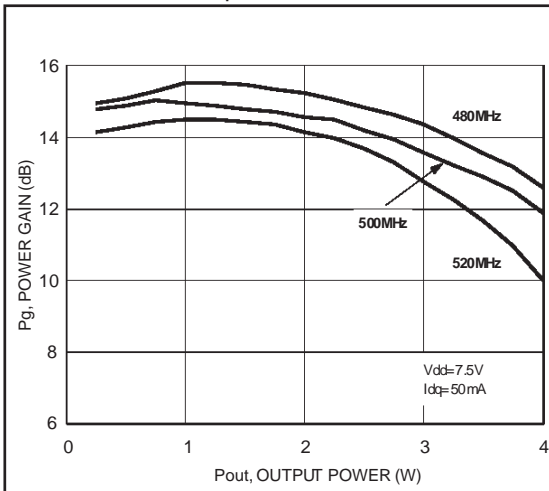


Output Power vs. Input Power

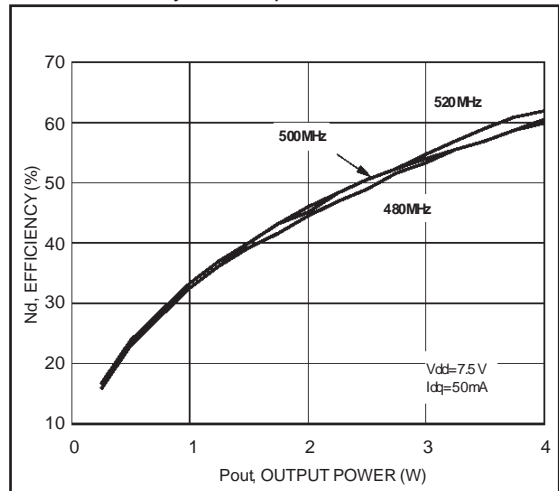
PD54003S



Power Gain vs. Output Power



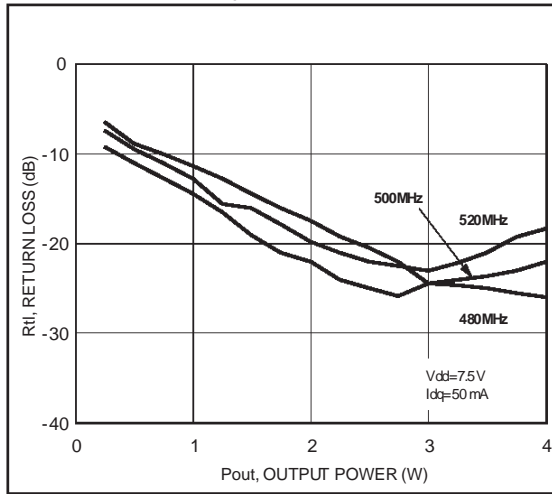
Drain Efficiency vs. Output Power



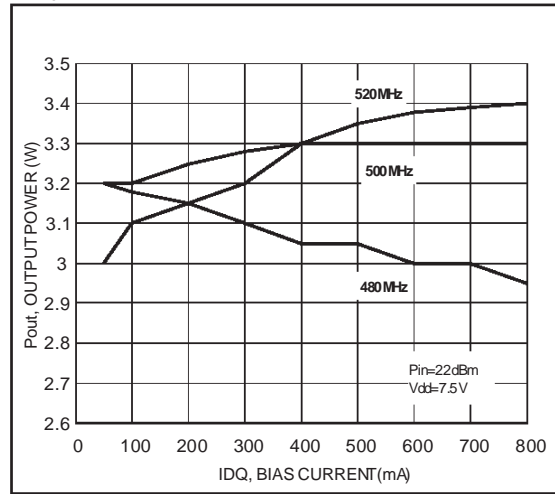
PD54003 - PD54003S

TYPICAL PERFORMANCE

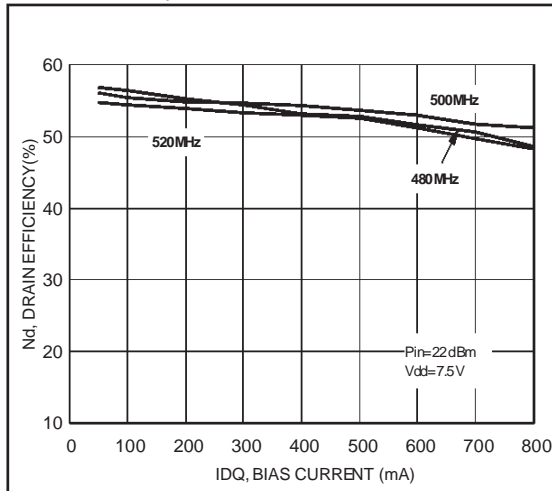
Return Loss vs. Output Power



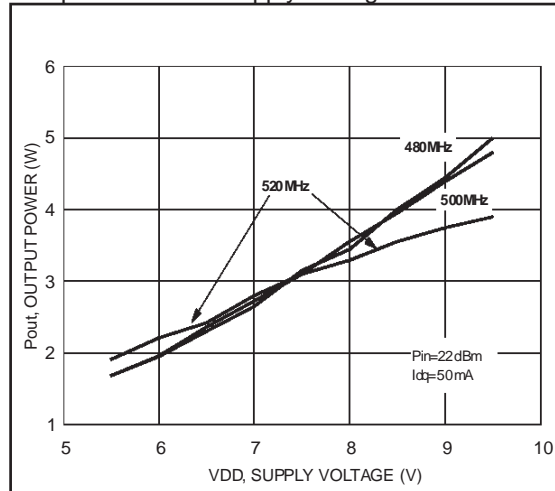
Output Power vs. Bias Current



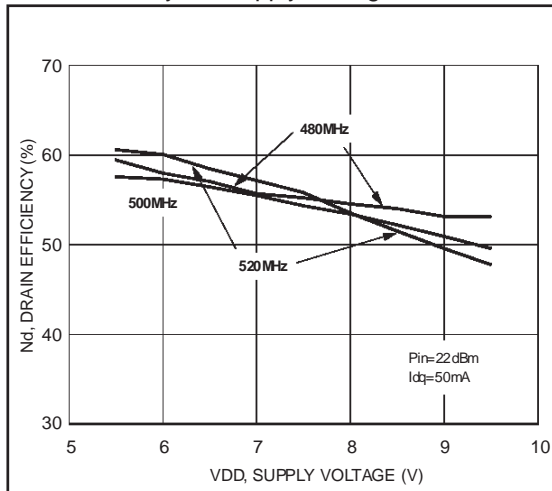
Drain Efficiency vs. Bias Current



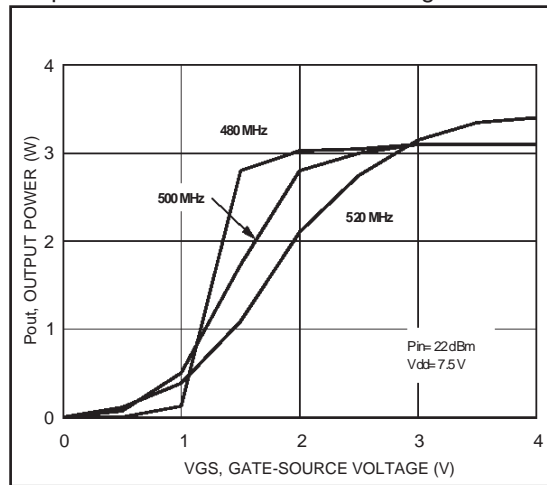
Output Power vs. Supply Voltage



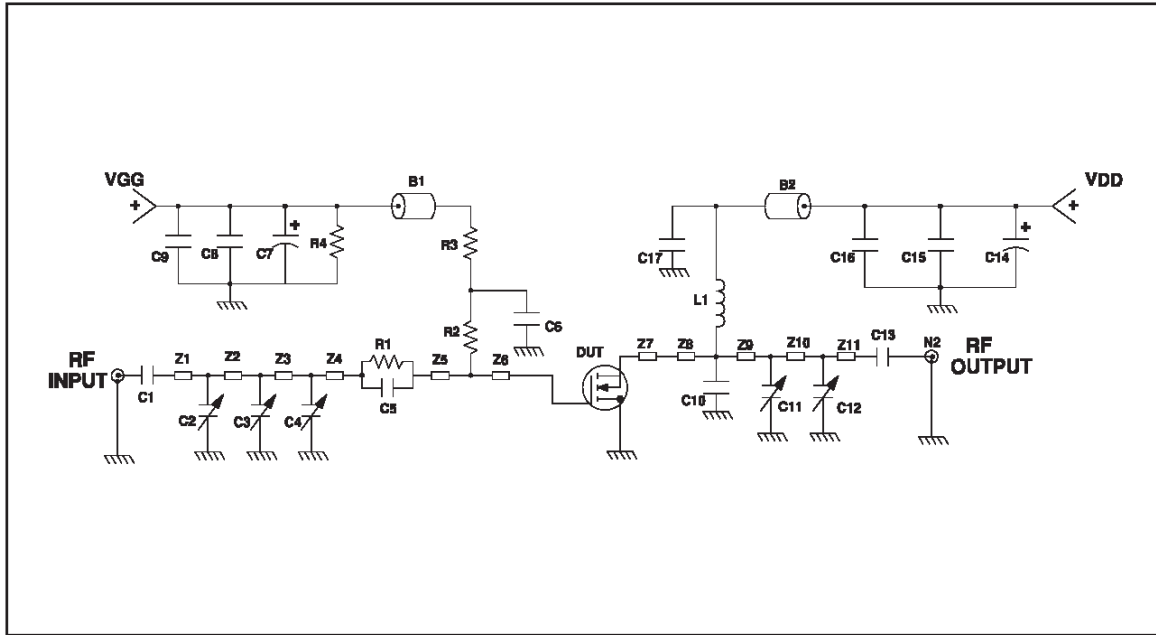
Drain Efficiency vs. Supply Voltage



Output Power vs. Gate-Source Voltage



TEST CIRCUIT SCHEMATIC

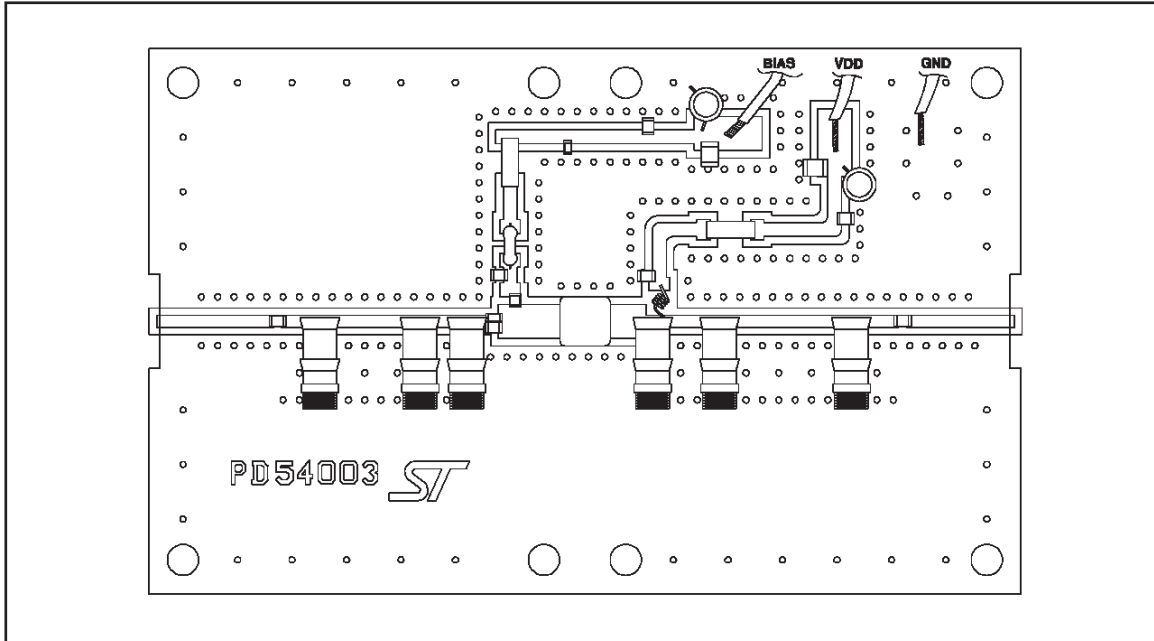


TEST CIRCUIT COMPONENT PART LIST

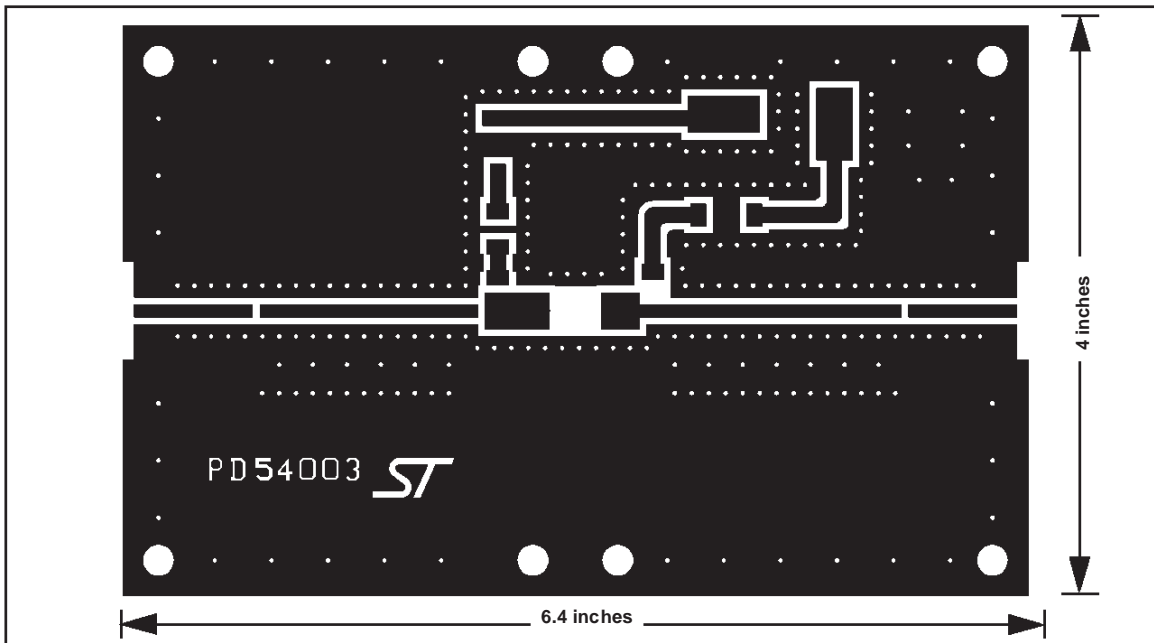
| | | | |
|--------------------------|---|-------|---|
| B1,B2 | SHORT FERRITE BEAD, FAIR RITE PRODUCTS (2743021446) | R3 | 15 Ω, 0805 CHIP RESISTOR |
| C1,C13 | 240pF, 100 mil CHIP CAPACITOR | R4 | 33 KΩ, 1/8 W RESISTOR |
| C2,C3,C4,C10, C11,C12 | 0 TO 20pF TRIMMER CAPACITOR | Z1 | 0.175" X 0.080" MICROSTRIP |
| C5 | 130pF, 100 mil CHIP CAP | Z2 | 1.049" X 0.080" MICROSTRIP |
| C6,C17 | 120pF, 100 mil CHIP CAP | Z3 | 0.289" X 0.080" MICROSTRIP |
| C7,C14 | 10μF, 50V ELECTROLYTIC CAPACITOR | Z4 | 0.026" X 0.080" MICROSTRIP |
| C8,C15 | 1,200pF, 100 mil CHIP CAPACITOR | Z5 | 0.192" X 0.223" MICROSTRIP |
| C9,C16 | 0.1 F, 100 mil CHIP CAPACITOR | Z6,Z7 | 0.260" X 0.223" MICROSTRIP |
| L1 | 55.5 Nh, 5 TURN, COILCRAFT | Z8 | 0.064" X 0.080" MICROSTRIP |
| N1,N2 | TYPE N FLANGE MOUNT | Z9 | 0.334" X 0.080" MICROSTRIP |
| R1 | 15 Ω, 0805 CHIP RESISTOR | Z10 | 0.985" X 0.080" MICROSTRIP |
| R2 | 1,0 KΩ, 1/8 W RESISTOR | Z11 | 0.472" X 0.080" MICROSTRIP |
| | | BOARD | ROGER, ULTRA LAM 2000 THK 0.030", $\epsilon_r = 2.55$ 2oz. ED Cu 2 SIDES. |

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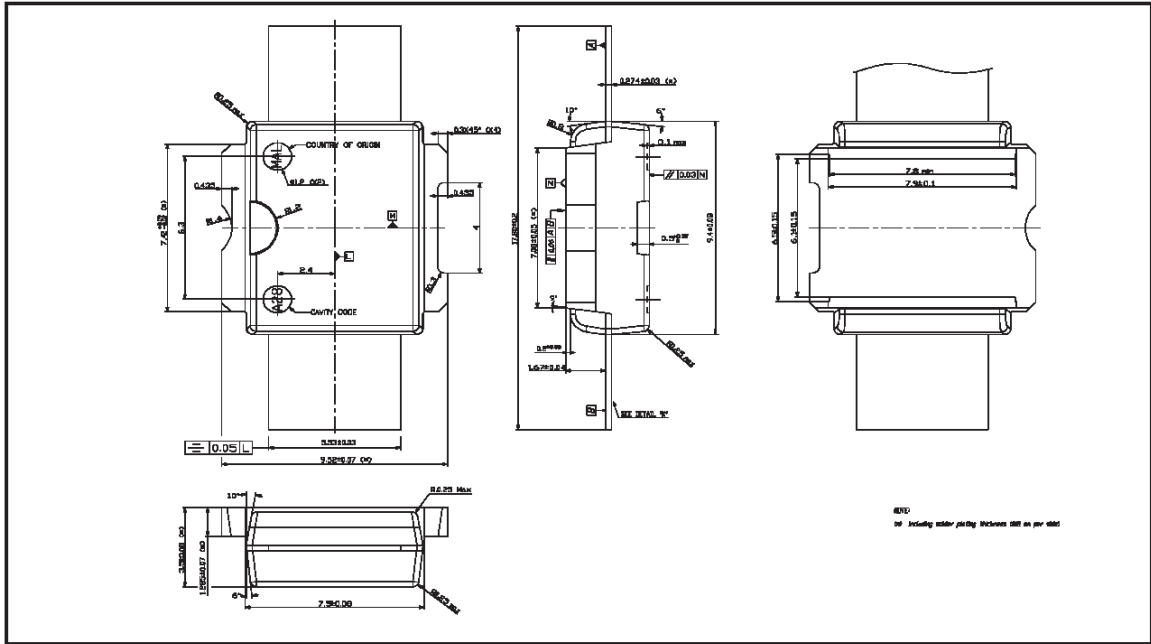
TEST CIRCUIT



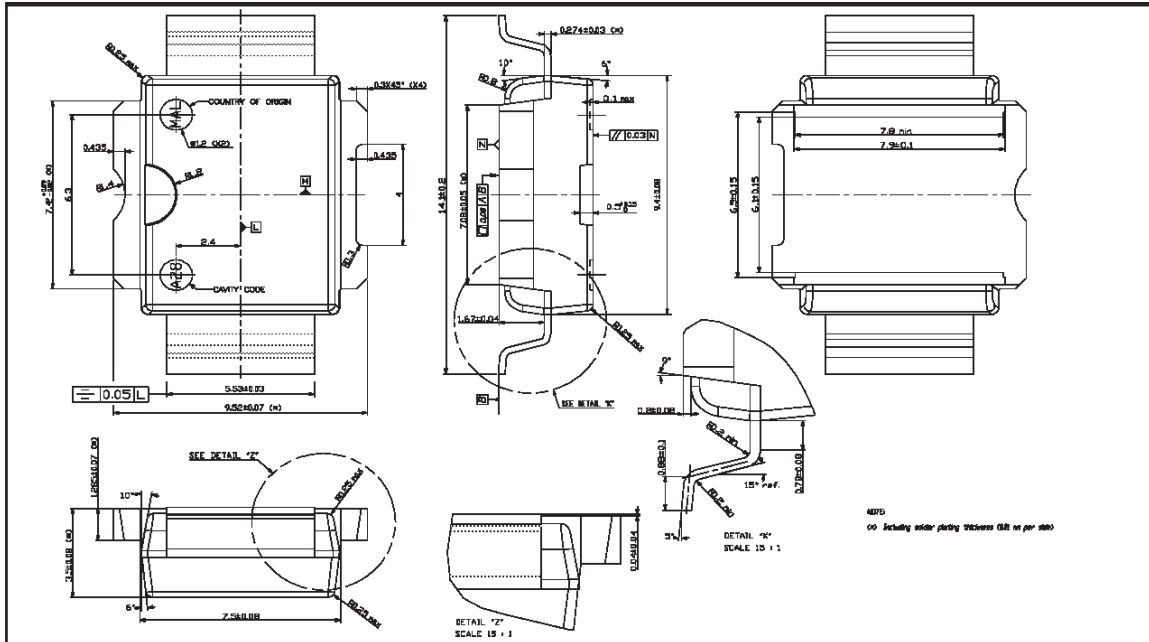
TEST CIRCUIT PHOTOMASTER



PowerSO-10RF (Straight Lead) MECHANICAL DATA



PowerSO-10RF (Formed Lead) MECHANICAL DATA



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