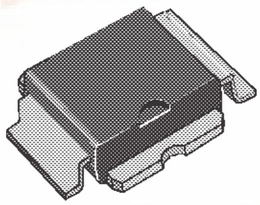
PD54003 - PD54003S

RF POWER TRANSISTORS
The *LdmoST* Plastic FAMILY

PRELIMINARY DATA

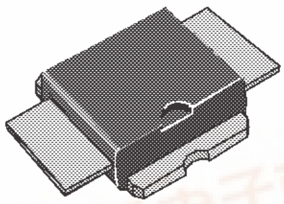
N-CHANNEL ENHANCEMENT-MODE LATERAL MOSFETs

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



PowerSO-10RF
(Formed Lead)

ORDER CODE	BRANDING
PD54003	XPD54003



PowerSO-10RF
(Straight Lead)

ORDER CODE	BRANDING
PD54003S	XPD54003S

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.

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 (@ Tc = 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

ELECTRICAL SPECIFICATION (T_{CASE} = 25 ^{0}C)

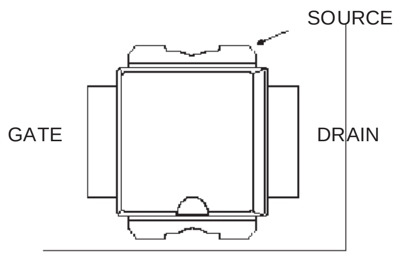
STATIC

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

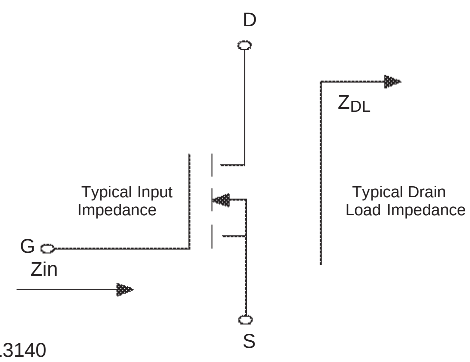
DYNAMIC

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

PIN CONNECTION



SC15200



SC13140

IMPEDANCE DATA

PD54003

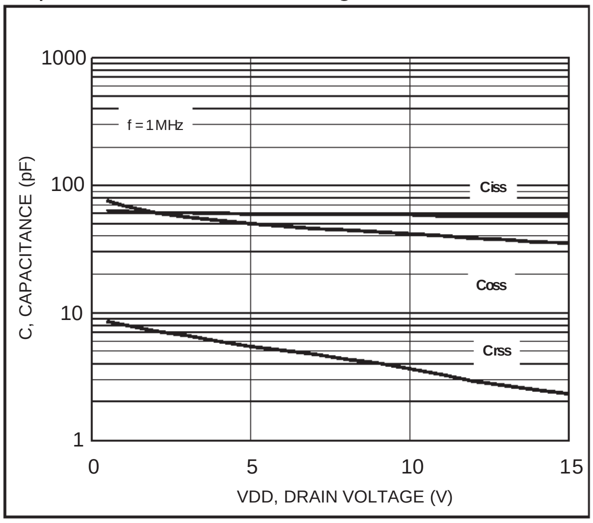
Frequency MHz	Zin Ω	Zdl Ω
520	1.993 - j1.098	2.564 + j0.656
500	1.553 - j1.251	2.661 + j0.139
480	2.245 - j0.077	3.436 + j1.013

PD54003S

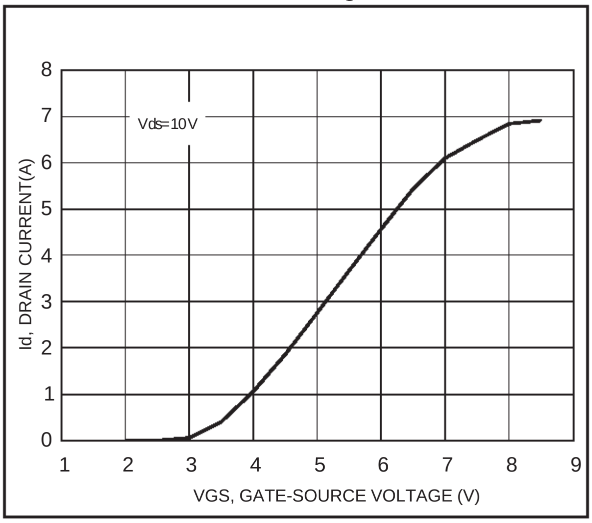
Frequency MHz	Zin Ω	Zdl Ω
520	1.534 - j2.104	2.524 + j2.369
500	1.209 - j2.451	3.192 + j3.147
480	1.400 - j3.986	2.805 + j2.724

TYPICAL PERFORMANCE

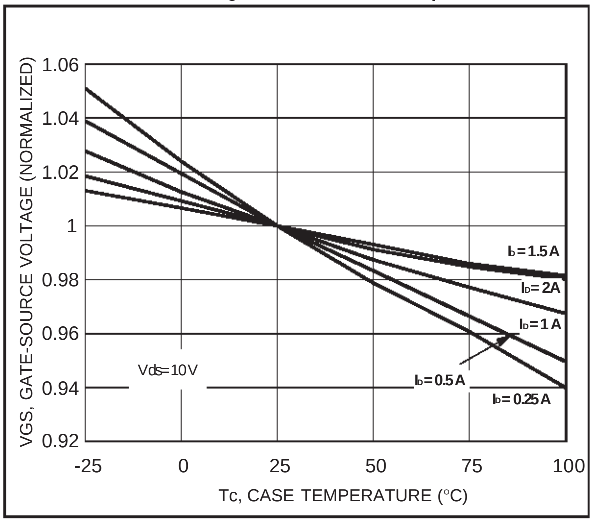
Capacitance vs. Drain Voltage



Drain Current vs. Gate Voltage



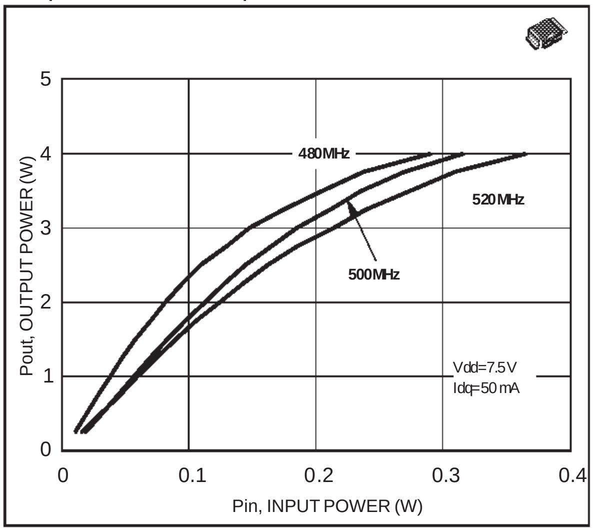
Gate-Source Voltage vs. Case Temperature



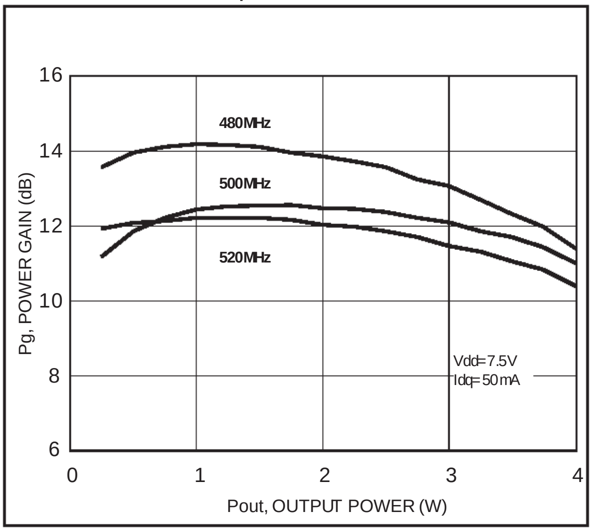
TYPICAL PERFORMANCE

Output Power vs. Input Power

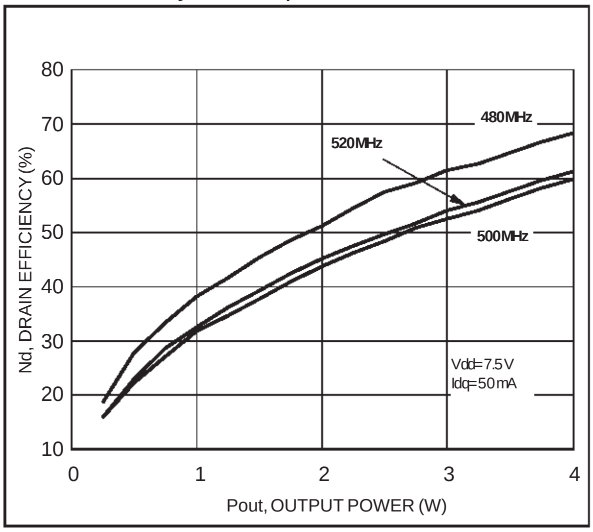
PD54003



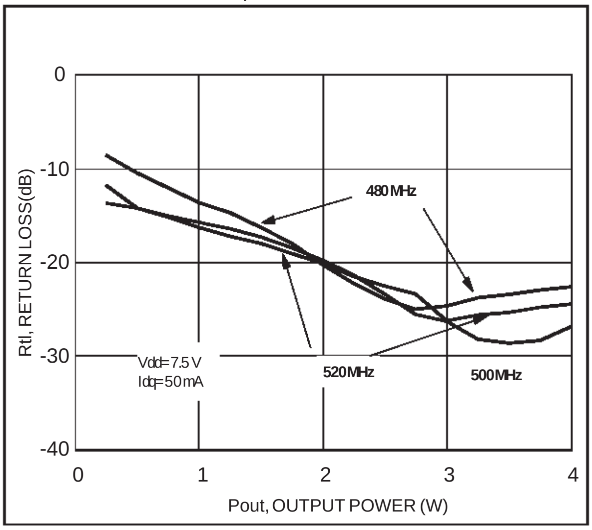
Power Gain vs. Output Power



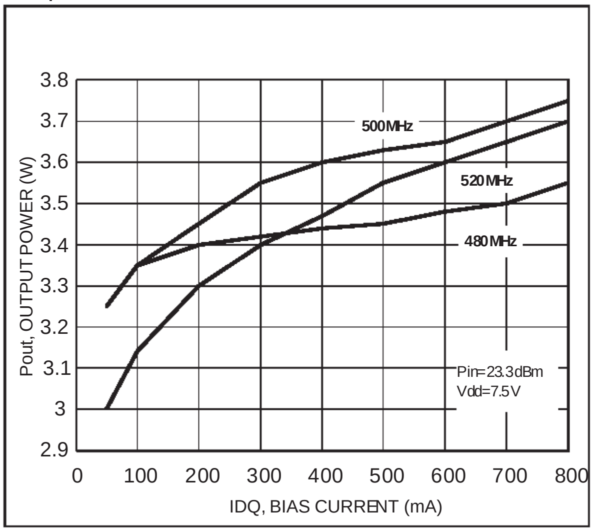
Drain Efficiency vs. Output Power



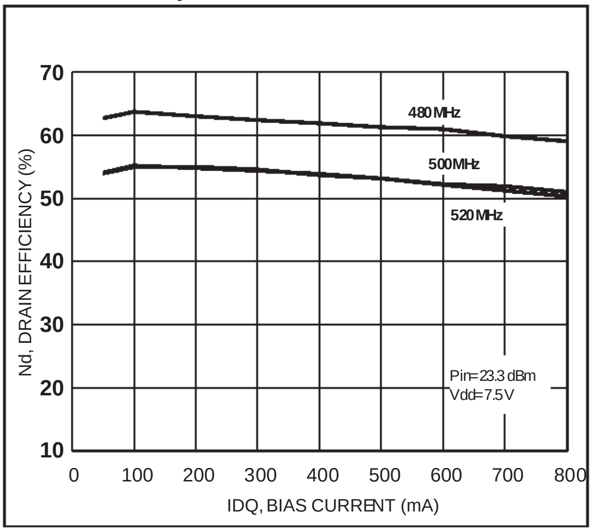
Return Loss vs. Output Power



Output Power vs. Bias Current

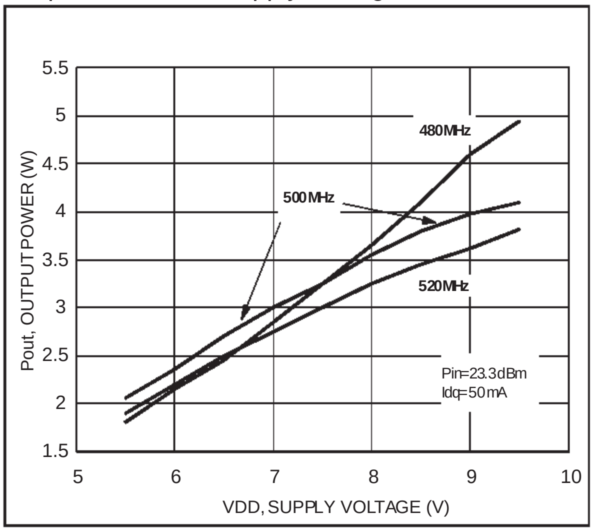


Drain Efficiency vs. Bias Current

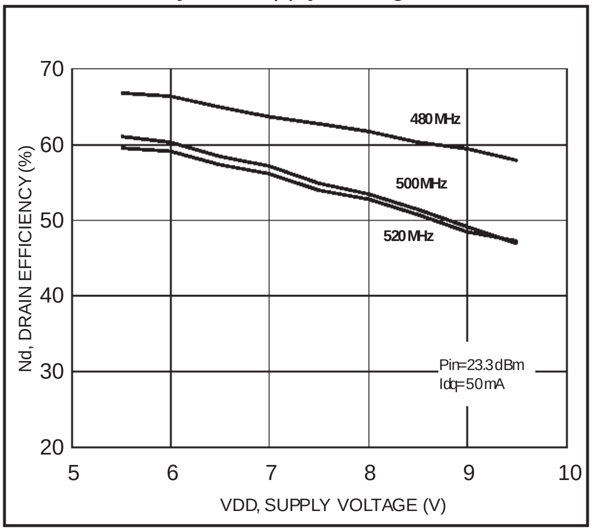


TYPICAL PERFORMANCE

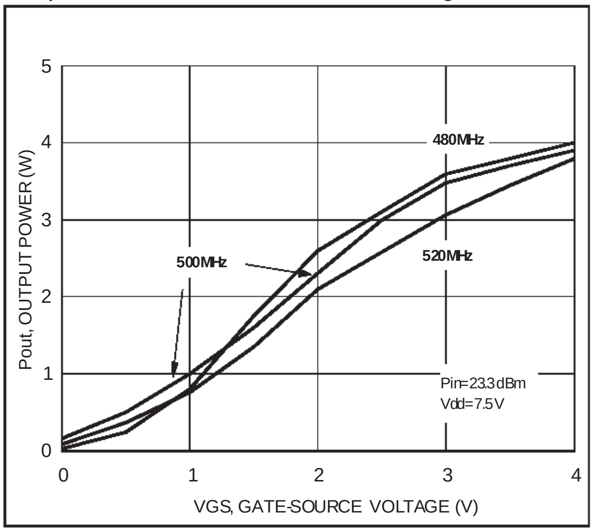
Output Power vs. Supply Voltage



Drain Efficiency vs. Supply Voltage

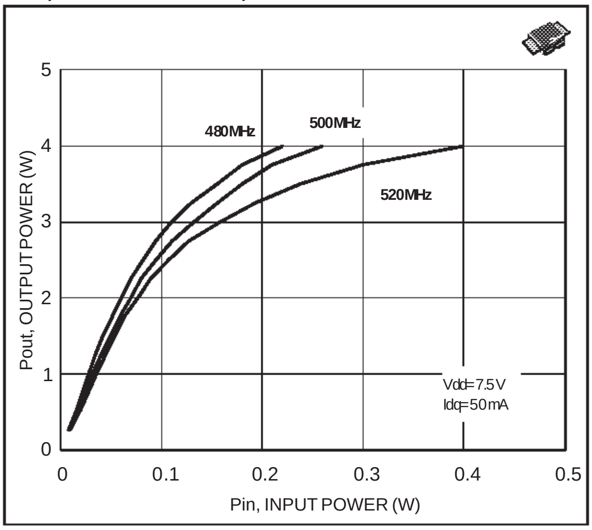


Output Power vs. Gate-Source Voltage

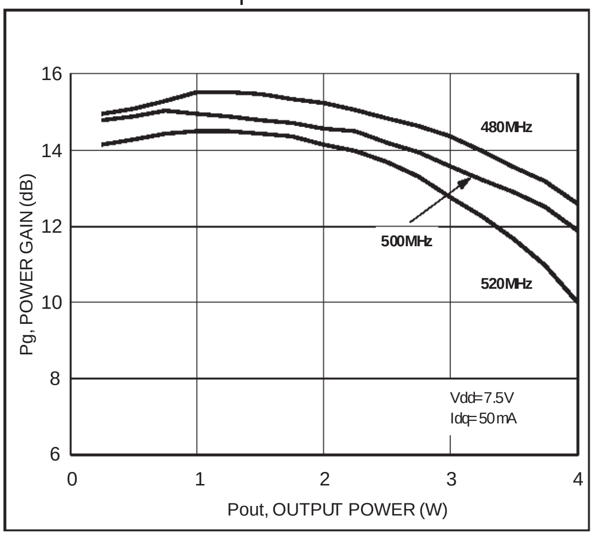


Output Power vs. Input Power

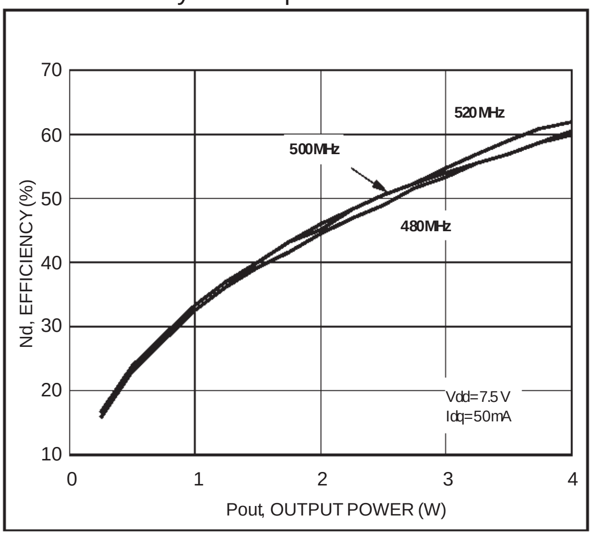
PD54003S



Power Gain vs. Output Power

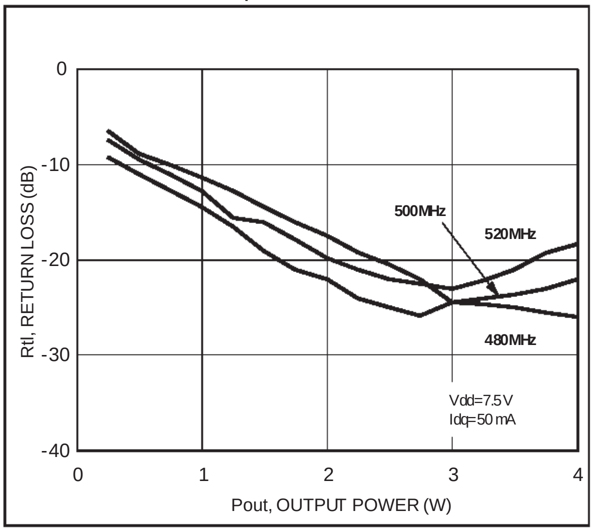


Drain Efficiency vs. Output Power

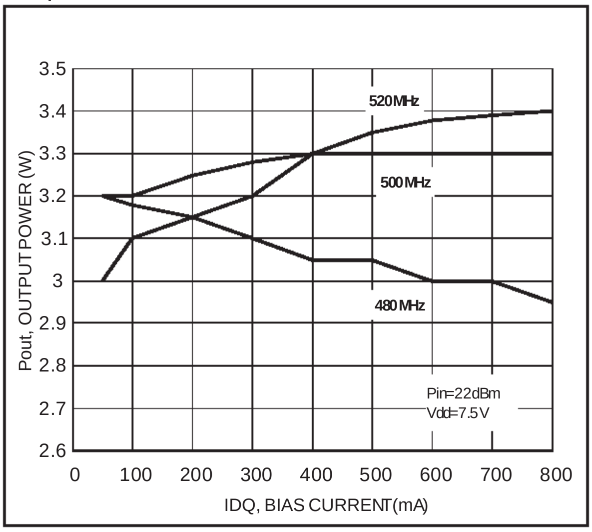


TYPICAL PERFORMANCE

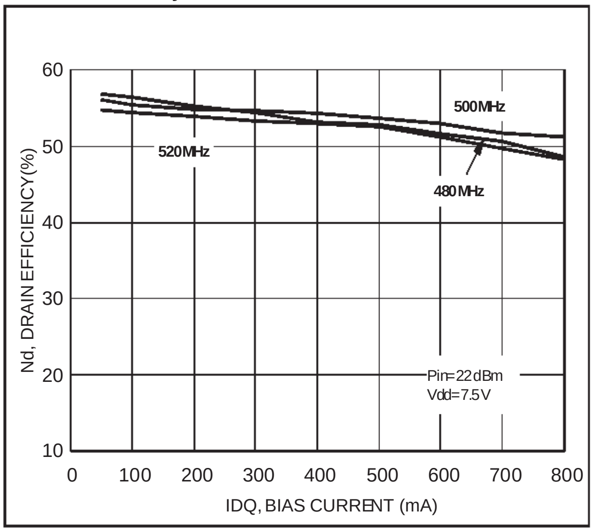
Return Loss vs. Output Power



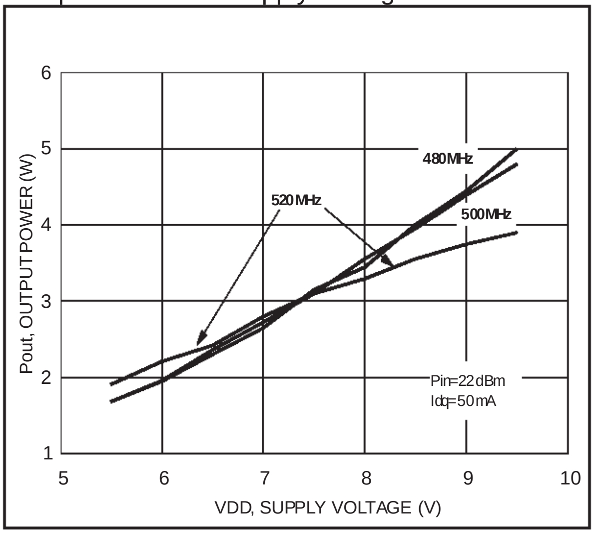
Output Power vs. Bias Current



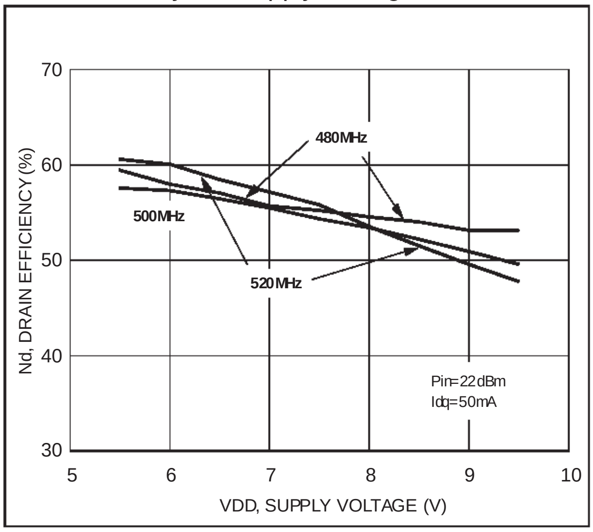
Drain Efficency vs. Bias Current



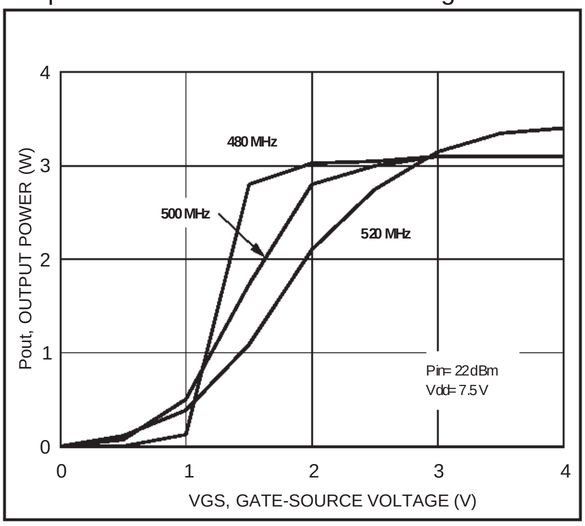
Output Power vs. Supply Voltage



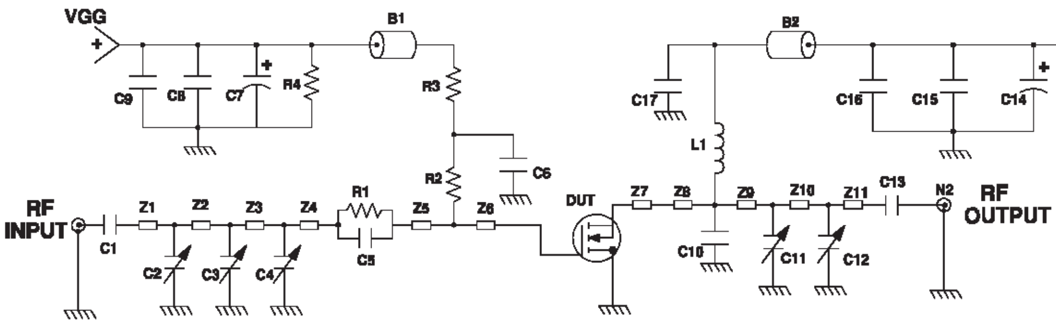
Drain Efficency vs. Supply Voltage



Output Power vs. Gate-Source Voltage



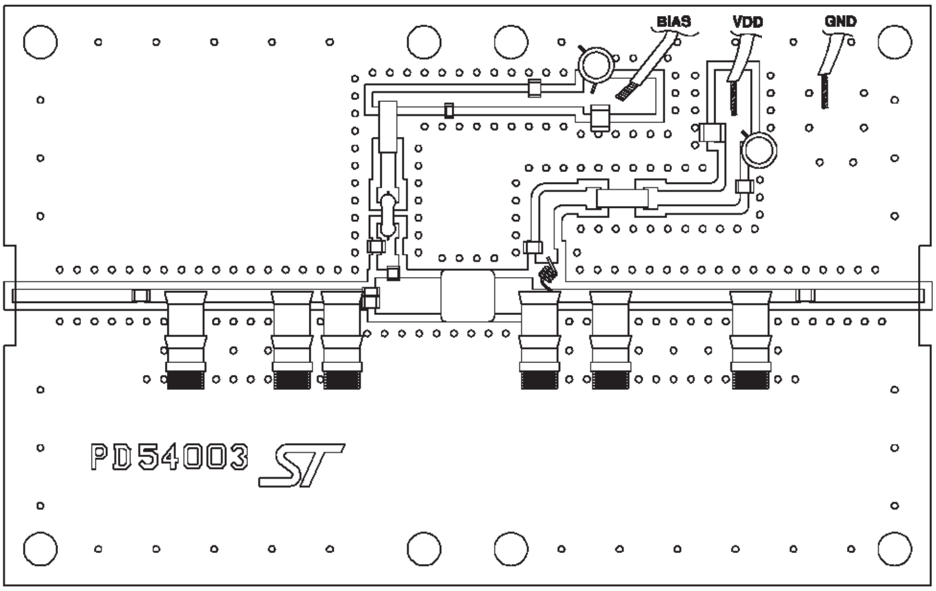
TEST CIRCUIT SCHEMATIC



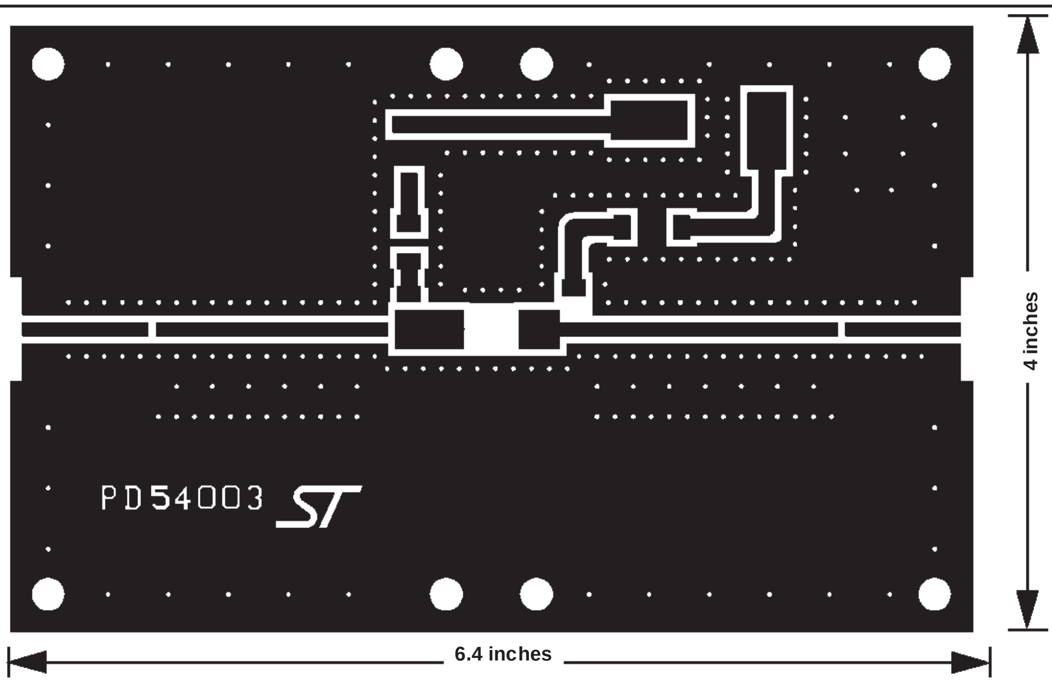
TEST CIRCUIT COMPONENT PART LIST

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", ε_r = 2.55 2oz. ED Cu 2 SIDES.

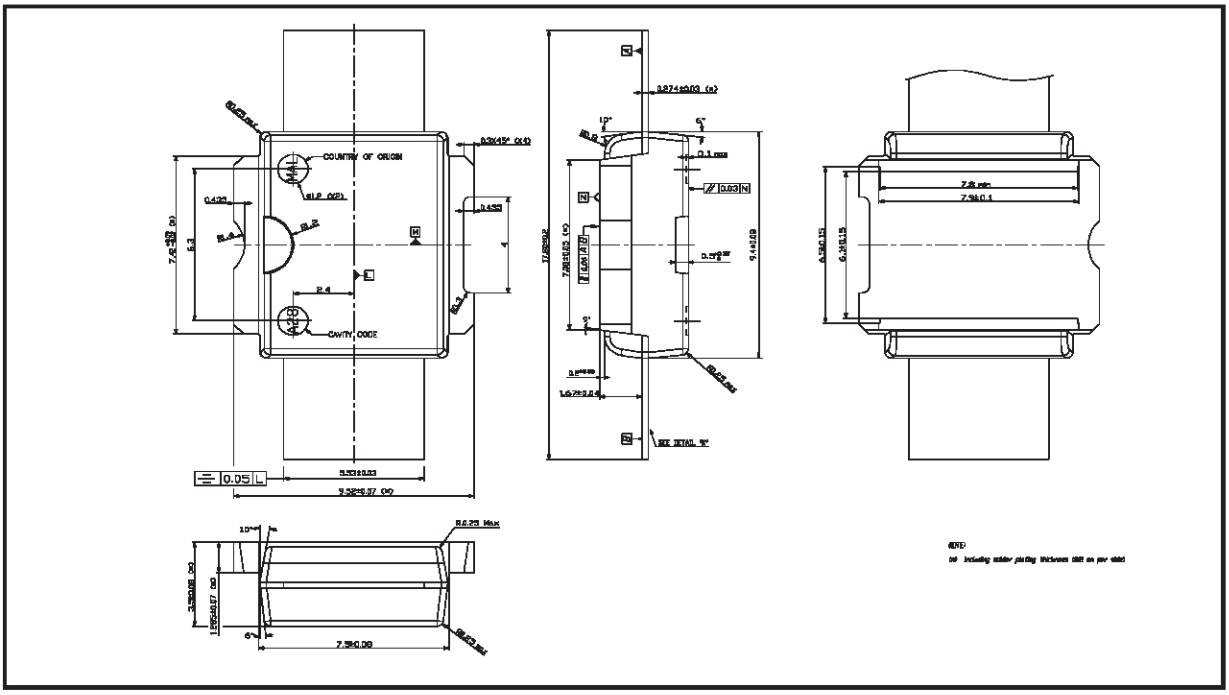
TEST CIRCUIT



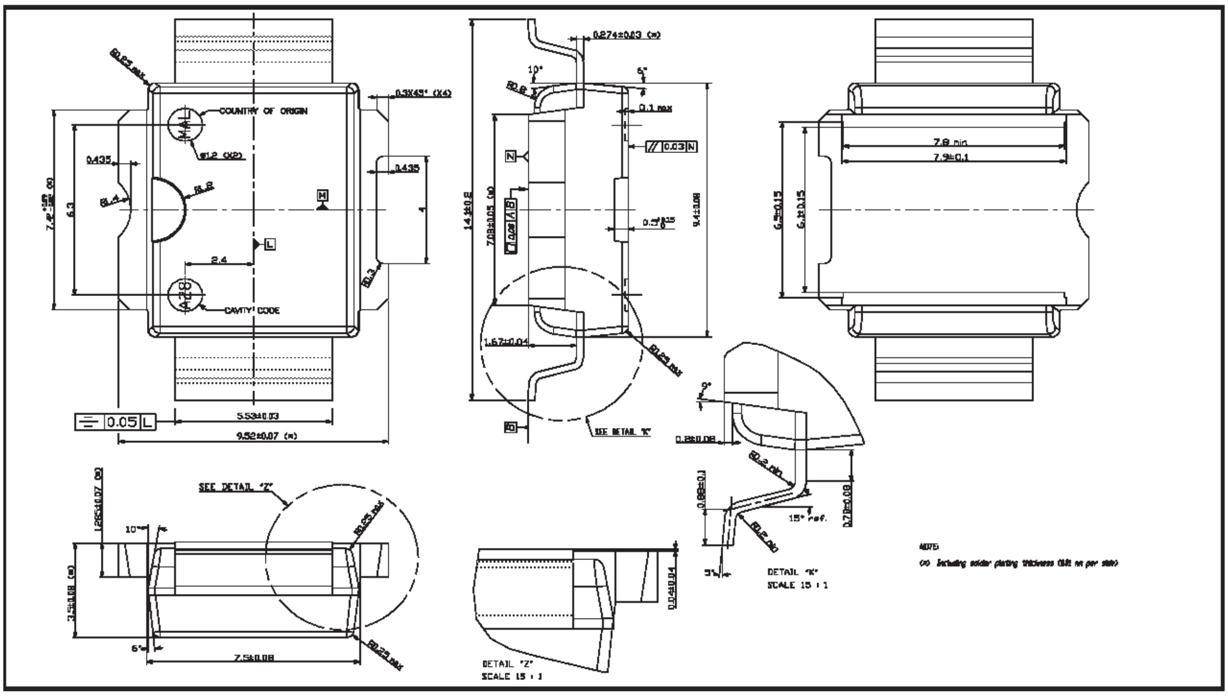
TEST CIRCUIT PHOTOMASTER



PowerSO-10RF (Straight Lead) MECHANICAL DATA



PowerSO-10RF (Formed Lead) MECHANICAL DATA



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