



SD2931-10

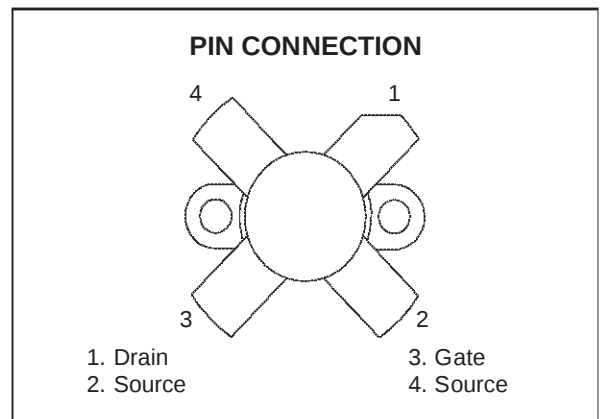
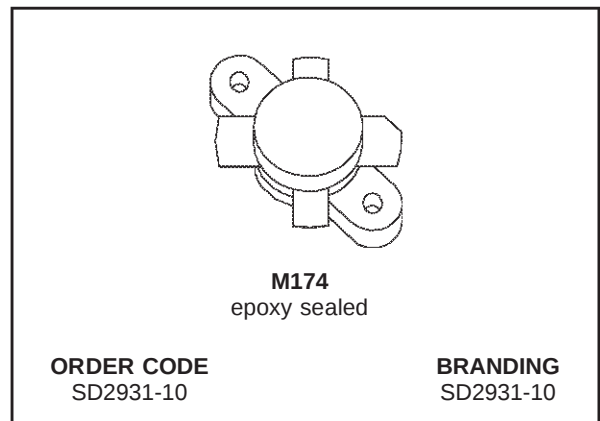
RF POWER TRANSISTORS HF/VHF/UHF N-CHANNEL MOSFETs

- GOLD METALLIZATION
- EXCELLENT THERMAL STABILITY
- COMMON SOURCE CONFIGURATION
- $P_{OUT} = 150\text{ W MIN. WITH } 14\text{ dB GAIN @ } 175\text{ MHz}$
- THERMALLY ENHANCED PACKAGING FOR LOWER JUNCTION TEMPERATURES

DESCRIPTION

The SD2931-10 is a gold metallized N-Channel MOS field-effect RF power transistor. Being electrically identical to the standard SD2931 MOSFET, it is intended for use in 50 V dc large signal applications up to 230 MHz.

The SD2931-10 is mechanically compatible to the SD2931 but offers in addition a better thermal capability (25 % lower thermal resistance), representing the best-in-class transistors for ISM applications, where reliability and ruggedness are critical factors.



ABSOLUTE MAXIMUM RATINGS ($T_{CASE} = 25^{\circ}\text{C}$)

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain Source Voltage	125	V
V_{DGR}	Drain-Gate Voltage ($R_{GS} = 1\text{M}\Omega$)	125	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current	20	A
P_{DISS}	Power Dissipation	389	W
T_j	Max. Operating Junction Temperature	200	$^{\circ}\text{C}$
T_{STG}	Storage Temperature	-65 to +150	$^{\circ}\text{C}$

THERMAL DATA

$R_{th(j-c)}$	Junction -Case Thermal Resistance	0.45	$^{\circ}\text{C/W}$
$R_{th(c-s)}$	Case-Heatsink Thermal Resistance*	0.2	$^{\circ}\text{C/W}$

* Determined using a flat aluminum or copper heatsink with thermal compound applied (Dow Corning 340 or equivalent).

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

STATIC

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$	$I_{DS} = 100\text{ mA}$	125			V
I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$			5	mA
I_{GSS}	$V_{GS} = 20\text{ V}$	$V_{DS} = 0\text{ V}$			5	μA
$V_{GS(Q)*}$	$V_{DS} = 10\text{ V}$	$I_D = 250\text{ mA}$	1.5		4.0	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 10\text{ A}$			3.0	V
G_{FS}	$V_{DS} = 10\text{ V}$	$I_D = 5\text{ A}$	5			mho
C_{ISS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		480		pF
C_{OSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		190		pF
C_{RSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 50\text{ V}$		18		pF

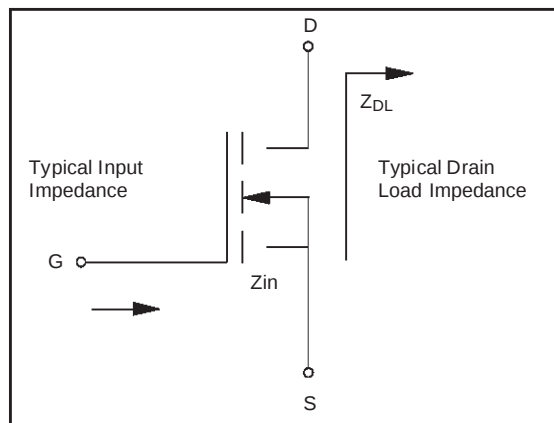
* $V_{GS(Q)}$ sorted with alpha/numeric code marked on unit.

REF. 7165489D

DYNAMIC

Symbol	Test Conditions		Min.	Typ.	Max.	Unit
P_{OUT}	$V_{DD} = 50\text{ V}$	$I_{DQ} = 250\text{ mA}$ $f = 175\text{ MHz}$	150			W
G_{PS}	$V_{DD} = 50\text{ V}$	$I_{DQ} = 250\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 175\text{ MHz}$	14	15		dB
η_D	$V_{DD} = 50\text{ V}$	$I_{DQ} = 250\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 175\text{ MHz}$	55	65		%
Load Mismatch	$V_{DD} = 50\text{ V}$	$I_{DQ} = 250\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 175\text{ MHz}$ All Phase Angles	10:1			VSWR

IMPEDANCE DATA



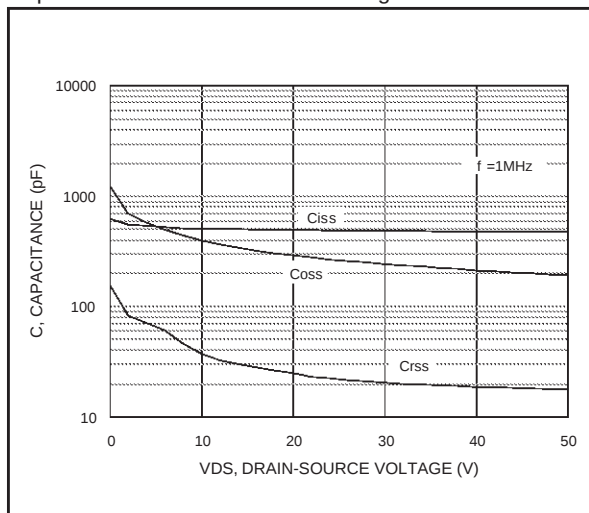
FREQ	$Z_{IN} (\Omega)$	$Z_{DL} (\Omega)$
30 MHz	$1.7 - j 5.7$	$6.8 + j 0.9$
175 MHz	$1.2 - j 2.0$	$2.0 + j 2.4$

 V_{GS} SORTS

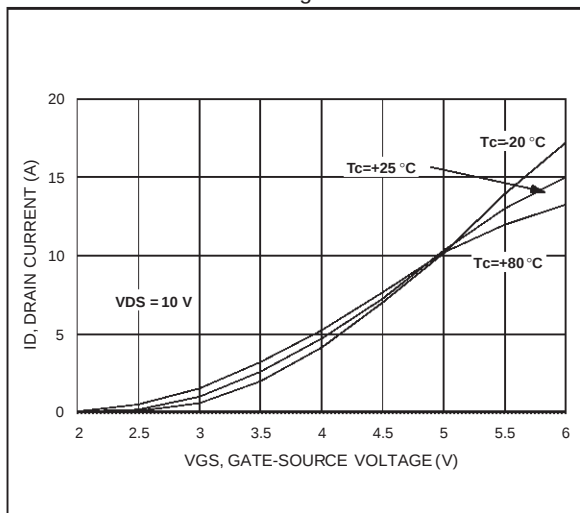
AA	1.5 - 1.6	J	2.8 - 2.9
BB	1.6 - 1.7	K	2.9 - 3.0
CC	1.7 - 1.8	L	3.0 - 3.1
DD	1.8 - 1.9	M	3.1 - 3.2
EE	1.9 - 2.0	N	3.2 - 3.3
A	2.0 - 2.1	P	3.3 - 3.4
B	2.1 - 2.2	Q	3.4 - 3.5
C	2.2 - 2.3	R	3.5 - 3.6
D	2.3 - 2.4	S	3.6 - 3.7
E	2.4 - 2.5	T	3.7 - 3.8
F	2.5 - 2.6	U	3.8 - 3.9
G	2.6 - 2.7	V	3.9 - 4.0
H	2.7 - 2.8		

TYPICAL PERFORMANCE

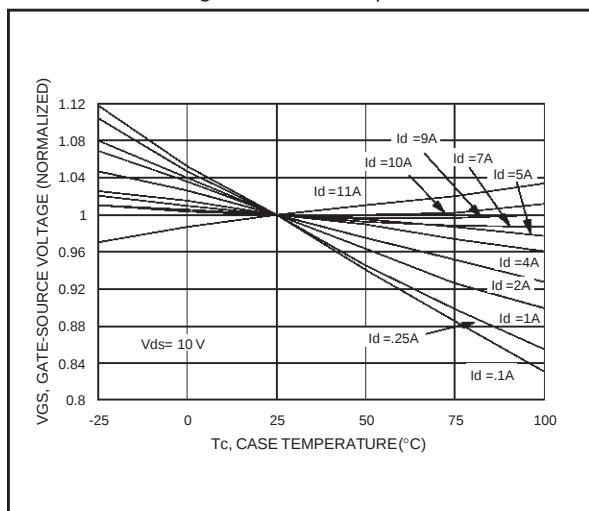
Capacitance vs. Drain-Source Voltage



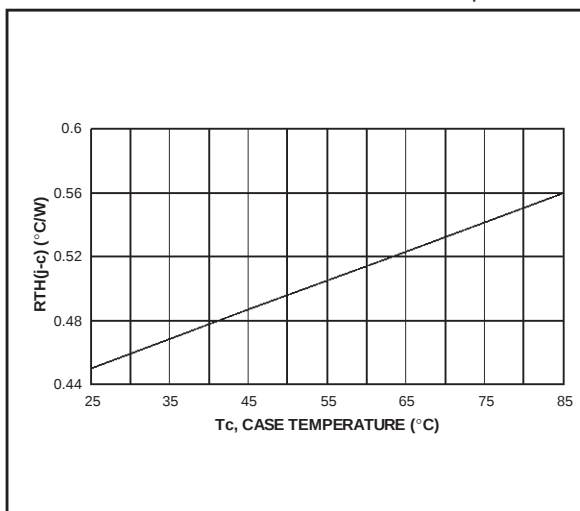
Drain Current vs. Gate Voltage



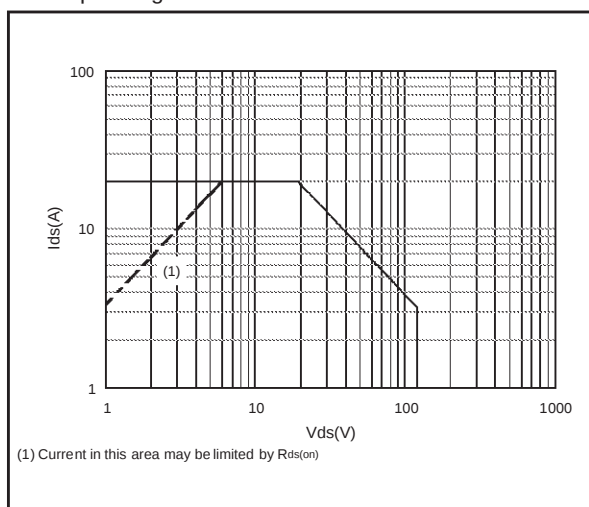
Gate-Source Voltage vs. Case Temperature



Maximum Thermal Resistance vs. Case Temperature

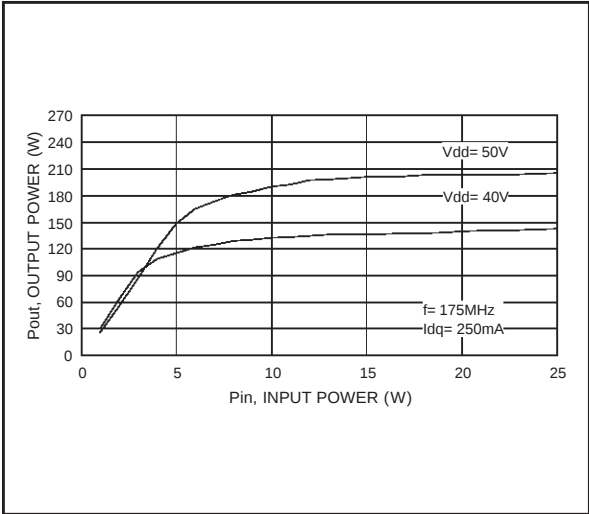


Safe Operating Area

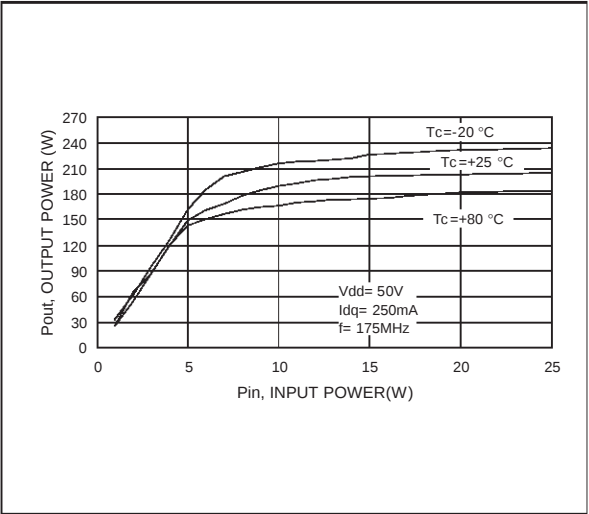


TYPICAL PERFORMANCE (175 MHz)

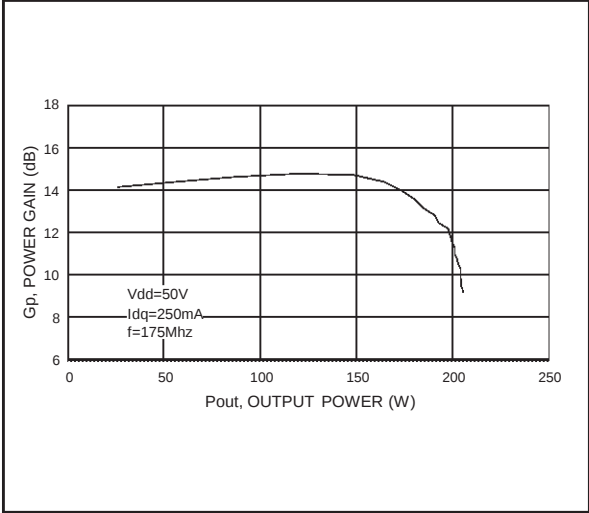
Output Power vs. Input Power



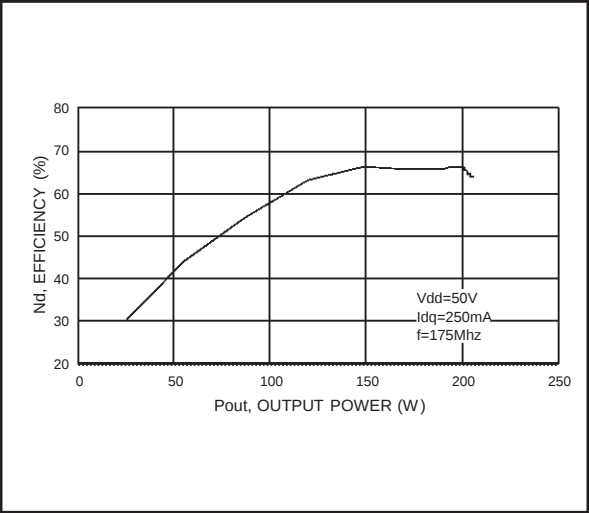
Output Power vs. Input Power



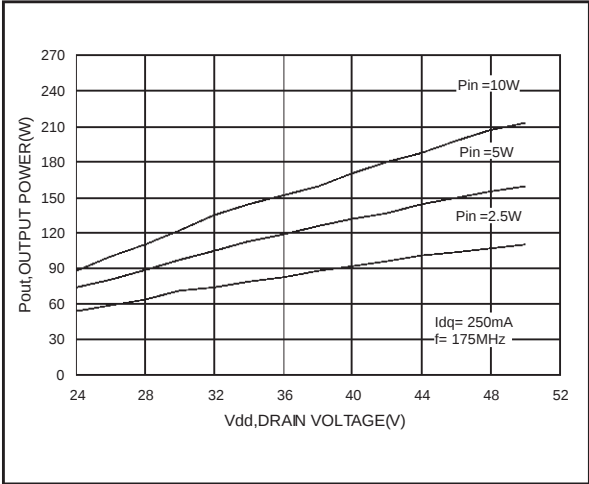
Power Gain vs. Output Power



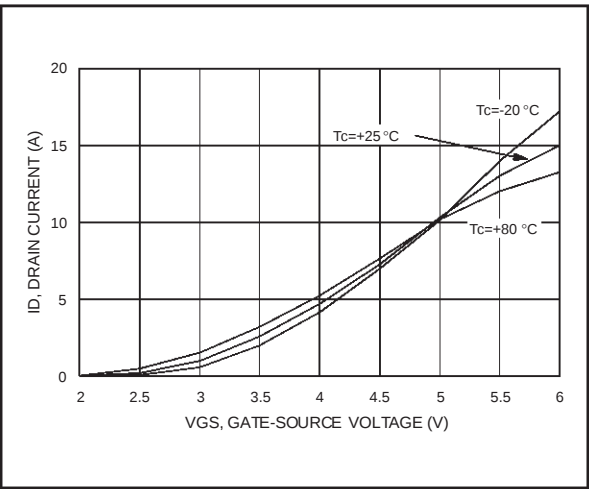
Efficiency vs. Output Power



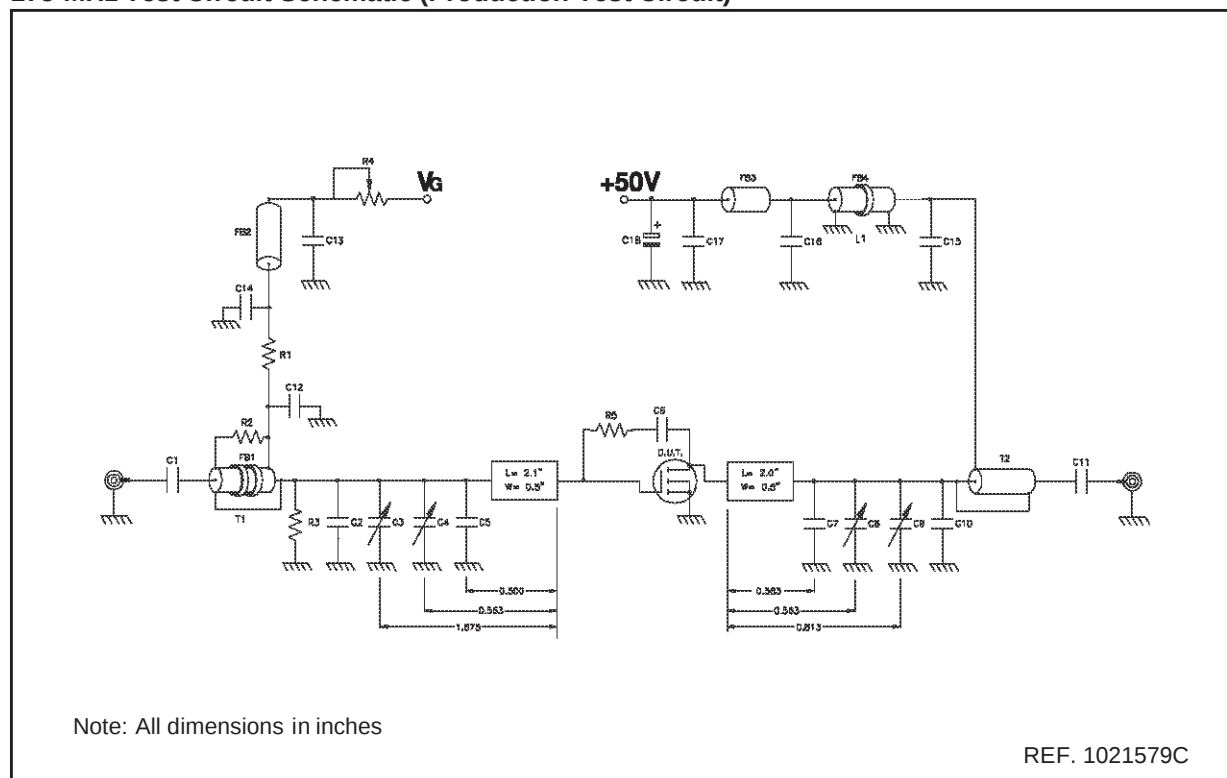
Output Power vs. Supply Voltage



Output Power vs. Gate Voltage



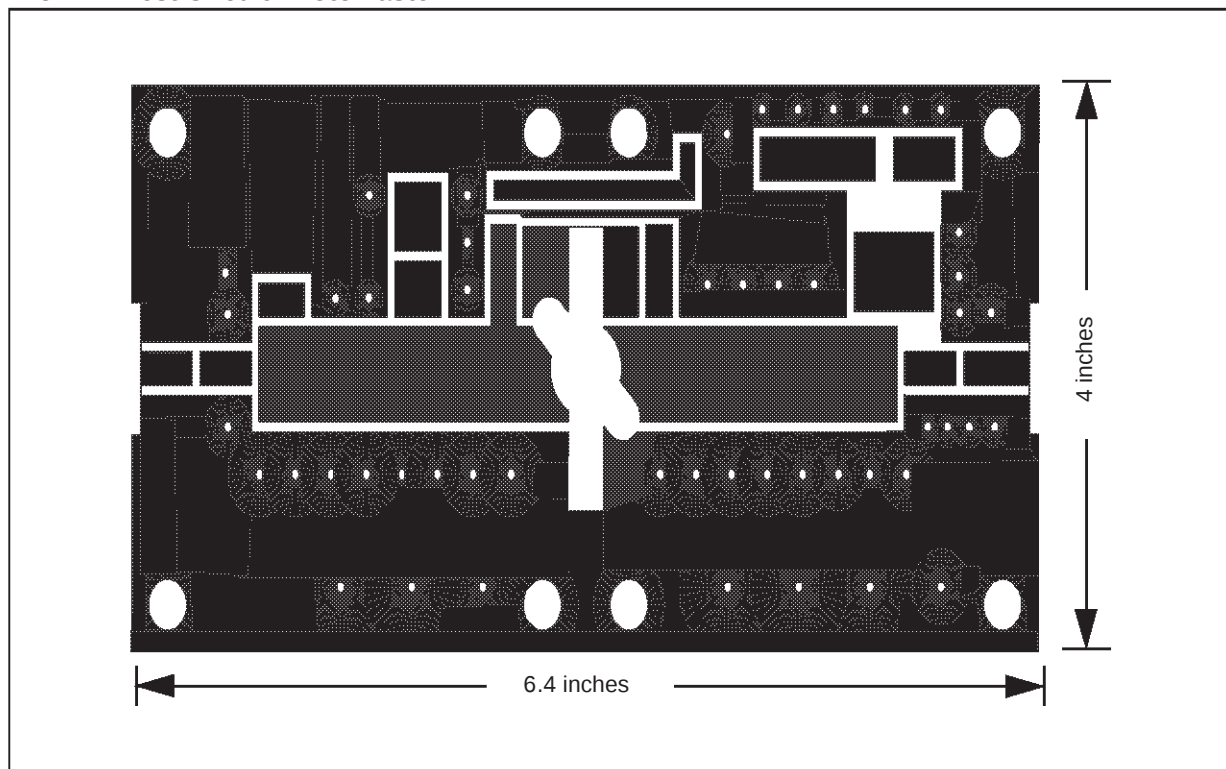
175 MHz Test Circuit Schematic (Production Test Circuit)



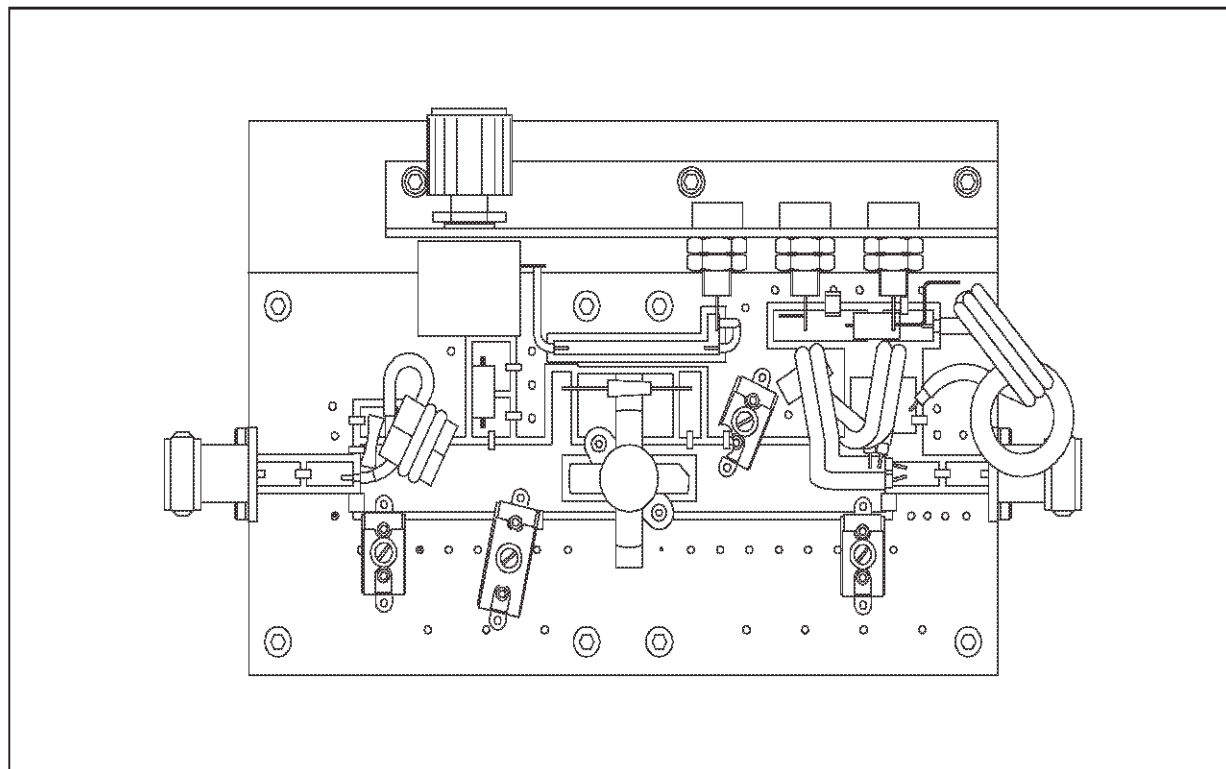
175 MHz Test Circuit Component Part List

T1	4:1 Transformer, 25 ohm Flexible Coax .090 OD 6" Long
T2	1:4 Transformer, 25 ohm Semi-Rigid Coax .141 OD 6" Long
FB1	Toroid X 2, 0.5" OD .312" ID 850μ 2 Turns
FB2, FB3	VK200
FB4	Shield Bead, 1" OD 0.5" ID 850μ 3 Turns
L1	1/4 Wave Choke, 50 ohm Semi-Rigid Coax .141 OD 12" Long
PCB	0.62" Woven Fiberglass, 1 oz. Copper, 2 Sides, $\epsilon_r = 2.55$
R1, R3	470 ohm 1 W Chip Resistor
R2	360 ohm 1/2 W Resistor
R4	20 Kohm 10 Turn Potentiometer
R5	560 ohm 1 W Resistor
C1, C11	470 pF ATC Chip Cap
C2	43 pF ATC Chip Cap
C3, C8, C9	Arco 404, 12-65 pF
C4	Arco 423, 16-100 pF
C5	120 pF ATC Chip Cap
C6	0.01 μF ATC Chip Cap
C7	30 pF ATC Chip Cap
C10	91 pF ATC Chip Cap
C12, C15	1200 pF ATC Chip Cap
C13, C14, C16, C17	0.01 μF / 500 V Chip Cap
C18	10 μF 63 V Electrolytic Capacitor

175 MHz Test Circuit Photomaster

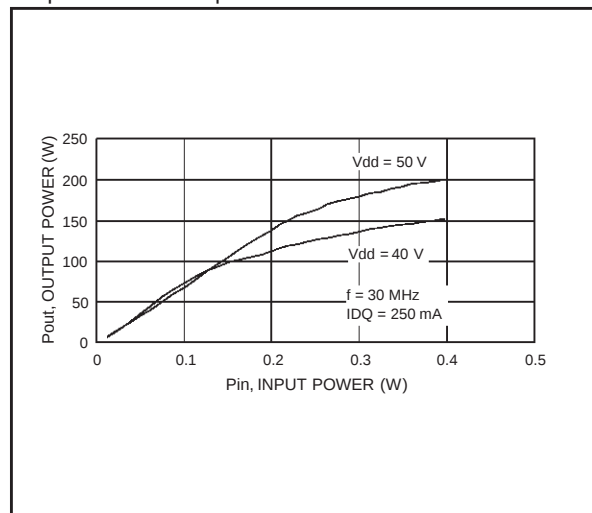


175 MHz Test Circuit

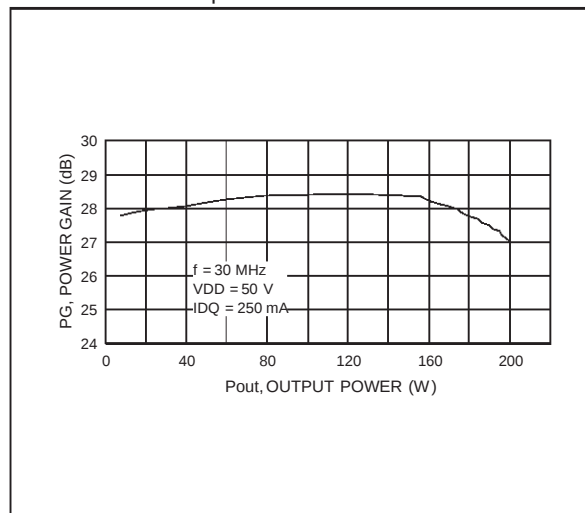


TYPICAL PERFORMANCE (30 MHz)

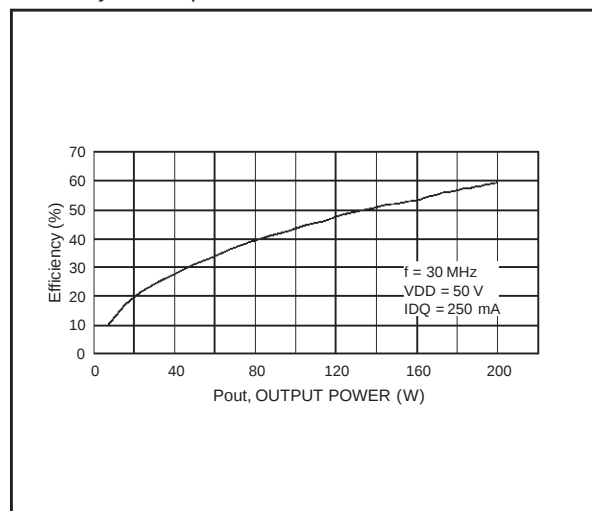
Output Power vs. Input Power



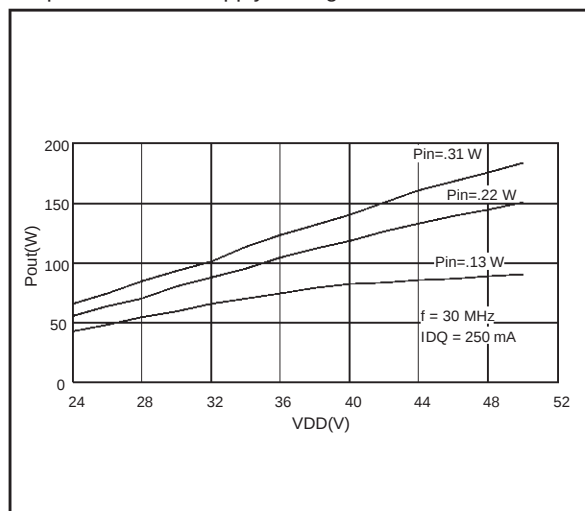
Power Gain vs. Output Power



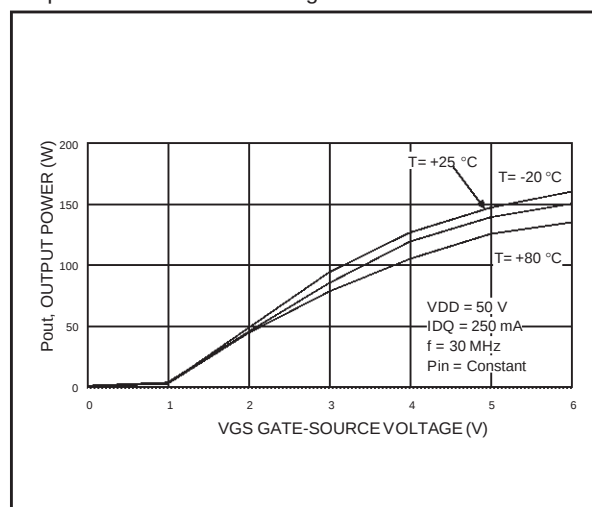
Efficiency vs. Output Power



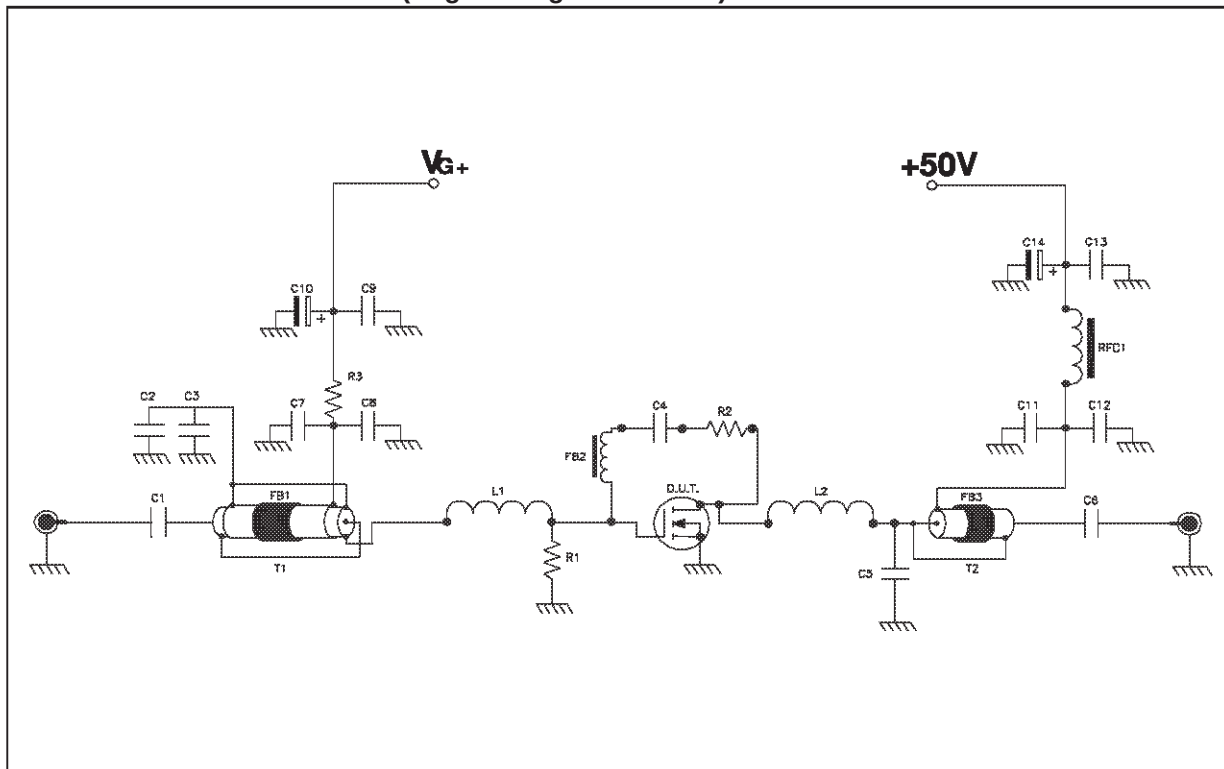
Output Power vs. Supply Voltage



Output Power vs. Gate Voltage



30 MHz Test Circuit Schematic (Engineering Test Circuit)

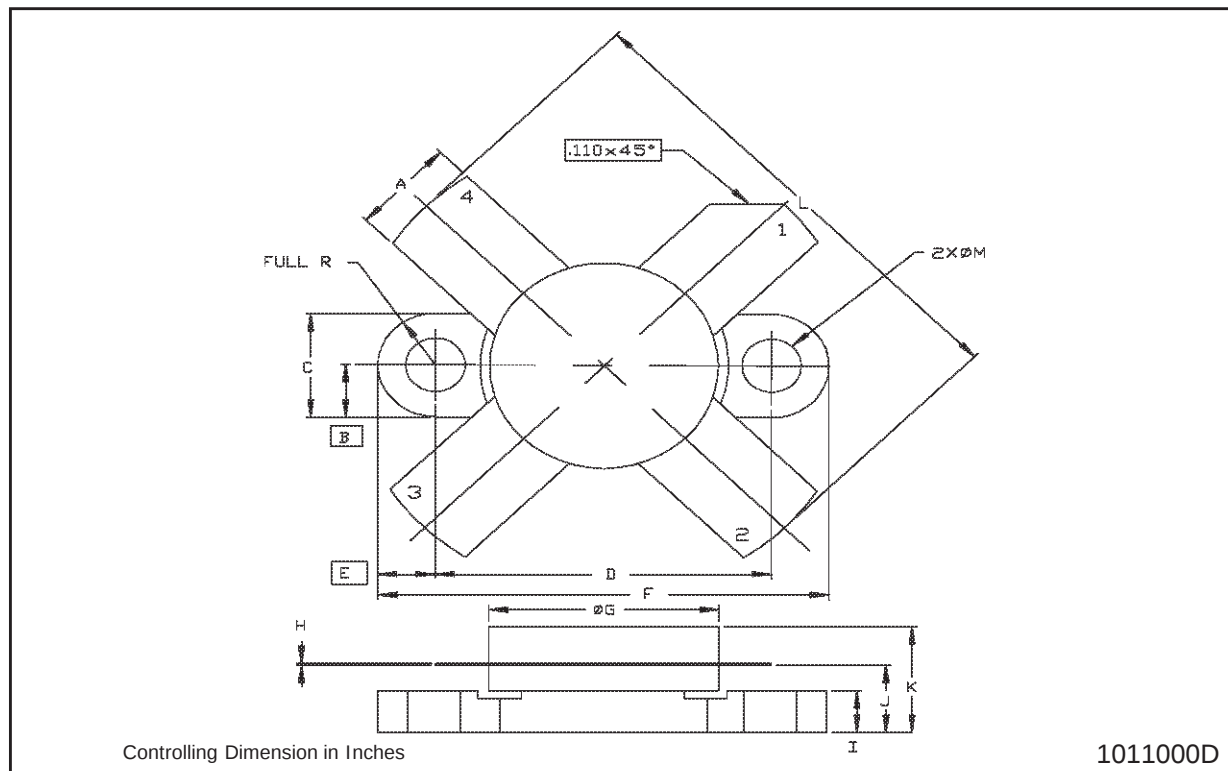


30 MHz Test Circuit Component Part List

T1	9:1 Transformer, 25 ohm Flexible Coax with extra shield .090 OD 15" Long
T2	1:4 Transformer, 50 ohm Flexible Coax .225 OD 15" Long
FB1	Toroid 1.7" OD .30" ID 220 μ 4Turns
FB2	Surface Mount EMI Shield Bead
FB3	Toroid 1.7" OD .300" ID 220 μ 3Turns
RFC1	Toroid 0.5" OD 0.30" ID 125 μ 4Turns 12 awg wire
PCB	0.62" Woven Fiberglass, 1 oz. Copper, 2 Sides, $\epsilon_r = 2.55$
R1, R3	1 K ohm 1 W Chip Resistor
R2	680 ohm 3W Wirewound Resistor
C1,C4,C6,C7,C8,C9, C11,C12,C13	0.1 μ F ATC Chip Cap
C2,C3	750 pF ATC Chip Cap
C5	470 pF ATC Chip Cap
C10	10 μ F 63 V Electrolytic Capacitor
C14	100 μ F 63 V Electrolytic Capacitor

M174 (.500 DIA 4/L N/HERM W/FLG) MECHANICAL DATA

DIM.	mm			Inch		
	MIN.	TYP.	MAX	MIN.	TYP.	MAX
A	5.56		5.584	0.219		0.230
B		3.18			0.125	
C	6.22		6.48	0.245		0.255
D	18.28		18.54	0.720		0.730
E		3.18			0.125	
F	24.64		24.89	0.970		0.980
G	12.57		12.83	0.495		0.505
H	0.08		0.18	0.003		0.007
I	2.11		3.00	0.083		0.118
J	3.81		4.45	0.150		0.175
K			7.11			0.280
L	25.53		26.67	1.005		1.050
M	3.05		3.30	0.120		0.130



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