

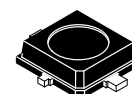
*Advance Information*  
**The RF Small Signal Line**  
**Gallium Arsenide PHEMT**  
**Pseudomorphic High Electron Mobility Transistor**

**MRF9822T1**

**31 dBm, 850 MHz**  
**HIGH FREQUENCY**  
**POWER TRANSISTOR**  
**GaAs PHEMT**

Designed for use in low voltage, moderate power amplifiers such as portable analog and digital cellular radios and PC RF modems.

- Performance Specifications at 3.5 V, 850 MHz:  
Output Power = 31 dBm Min  
Power Gain = 11 dB Typ  
Efficiency = 70% Min
- Guaranteed Ruggedness at Load VSWR = 20:1
- New Plastic Surface Mount Package
- Available in Tape and Reel Packaging Options:  
T1 suffix = 1,000 Units per Reel
- Device Marking = 9822



CASE 449-02, STYLE 1  
(PLD-1)

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Drain–Gate Voltage	$V_{DGO}$	12	Vdc
Gate–Source Voltage	$V_{GS}$	– 6	Vdc
Drain Current – Continuous	$I_D$	3	Adc
Total Device Dissipation @ $T_C = 50^\circ\text{C}$ Derate above $50^\circ\text{C}$	$P_D$	10 100	W mW/ $^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	– 65 to +150	$^\circ\text{C}$
Operating Temperature Range	$T_J$	150	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	10	$^\circ\text{C}/\text{W}$

**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

**OFF CHARACTERISTICS**

Drain–Gate Breakdown Voltage ( $I_D = 1.5 \text{ mA}$ )	$BV_{GDO}$	12	–	–	Vdc
Off–state Leakage Current ( $V_{DS} = 5.5 \text{ V}, V_{GS} = -2.6 \text{ V}$ )	$I_{DS(off)}$	–	–	3	mA
Gate–Source Leakage Current ( $V_{GS} = -2.6 \text{ V}$ )	$I_{GSS}$	–	–	10	$\mu\text{Adc}$

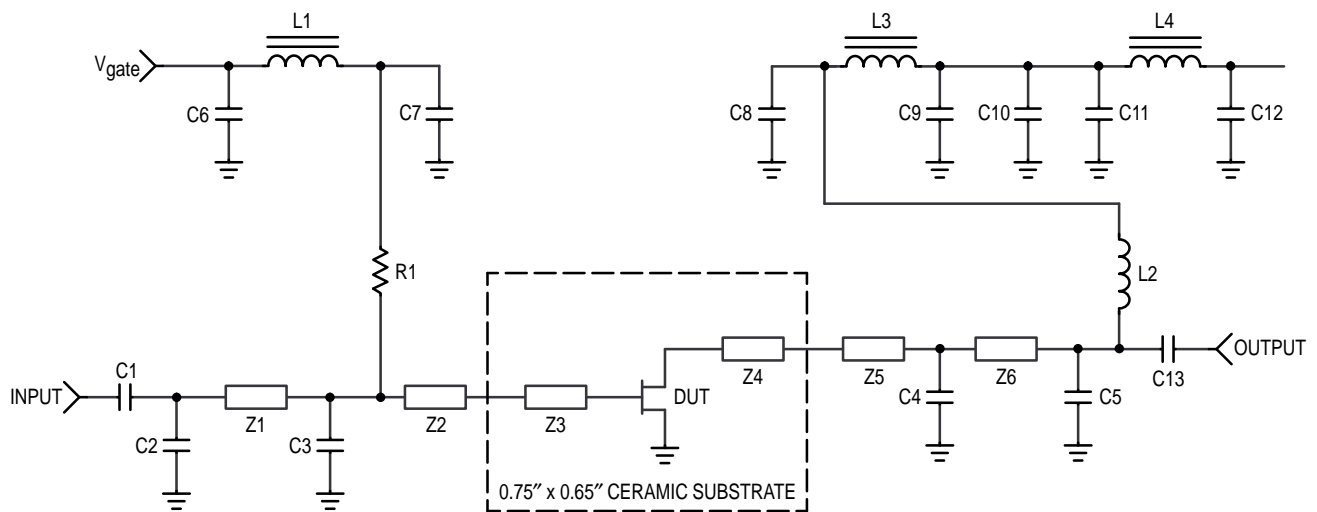
NOTE – **CAUTION** – MOS devices are susceptible to damage from electrostatic charge. Reasonable precautions in handling and packaging MOS devices should be observed.

**ELECTRICAL CHARACTERISTICS – continued** ( $T_C = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
Gate Threshold Voltage ( $V_{DS} = 3.5\text{ V}$ , $I_D = 150\text{ mA}$ )	$V_{GS(th)}$	-1.5	-	-0.5	Vdc
Forward Transconductance ( $V_{DS} = 6\text{ V}$ , $I_D = 200\text{ mA}$ )	$g_{fs}$	-	1.5	-	mhos
Saturation Drain-Current ( $V_{GS} = 0.0\text{ V}$ , $V_{DS} = 1.5\text{ V}$ )	$I_{DSS}$	1.8	2.5	-	A

**FUNCTIONAL CHARACTERISTICS**

Power Gain ( $V_{DD} = 3.5\text{ Vdc}$ , $P_{in} = 20\text{ dBm}$ , $I_{DQ} = 150\text{ mA}$ , $f = 850\text{ MHz}$ )	$G_{ps}$	10.5	11	-	dB
Drain Efficiency ( $V_{DD} = 3.5\text{ Vdc}$ , $P_{in} = 20\text{ dBm}$ , $I_{DQ} = 150\text{ mA}$ , $f = 850\text{ MHz}$ )	$\eta_D$	65	70	-	%



C1, C13	1000 pF, ATC "B" Series	L2	7 Turns, AWG #18, 0.09" I.D., Close Wound
C2	2.7 pF, ATC "B" Series	L3	3 Ferrite Beads on 1/2" AWG #16
C3	2.7 pF, ATC "B" Series	R1	680 $\Omega$ , 1/8 Watt Leaded
C4	7.5 pF, ATC "B" Series	Z1	0.075" x 0.790" Microstrip
C5	33 pF, ATC "B" Series	Z2	0.075" x 0.09" Microstrip
C6, C12	47 $\mu\text{F}$ , Ceramic	Z3, Z4	0.075" x 0.25" Microstrip
C7, C8, C9, C10, C11	0.05 $\mu\text{F}$ Chip	Z5	0.075" x 0.09" Microstrip
L1, L4	VK-200 4 Turn Ferrite Bead	Z6	0.075" x 0.53" Microstrip

Substrate Material: 0.05, Teflon/Glass,  $\epsilon_r = 2.55$ , 2 oz. cu.

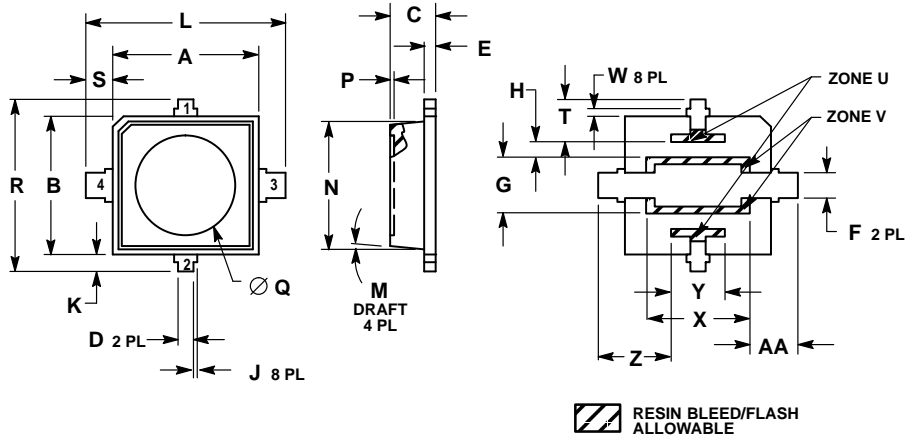
**Figure 1. 850 MHz Test Fixture Schematic**

**Table 1. Large Signal Impedance**  
 $V_{DD} = 3.5\text{ V}$ ,  $P_{in} = 20\text{ dBm}$ ,  $I_{DQ} = 150\text{ mA}$

f MHz	$Z_{in}$ Ohms	$Z_{OL}^*$ Ohms
850	$5.0 - j6.3$	$5.5 - j1.2$

$Z_{OL}^*$  is the conjugate of the optimum load impedance into which the device output operates at a given output power, voltage and frequency.

## PACKAGE DIMENSIONS




- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.185	0.195	4.70	4.95
B	0.175	0.185	4.44	4.70
C	0.058	0.064	1.47	1.63
D	0.017	0.023	0.43	0.58
E	0.014	0.017	0.36	0.43
F	0.027	0.033	0.69	0.84
G	0.071	0.077	1.80	1.96
H	0.017	0.023	0.43	0.58
J	0.000	0.007	0.00	0.18
K	0.018	0.026	0.46	0.66
L	0.253	0.263	6.43	6.68
M	5° REF		5° REF	
N	1.75 REF		4.44 REF	
P	0.000	0.006	0.00	0.15
Q	0.120	0.130	3.05	3.30
R	0.220	0.230	5.59	5.84
S	0.030	0.038	0.76	0.97
T	0.050	0.060	1.27	1.52
U	0.000	0.018	0.00	0.46
V	0.000	0.014	0.00	0.36
W	0.004	0.016	0.10	0.41
X	0.131	0.141	3.33	3.58
Y	0.065	0.075	1.65	1.90
Z	0.089	0.099	2.26	2.51
AA	0.056	0.066	1.42	1.67

**CASE 449-02  
ISSUE A**

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

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** <http://www.mot.com/sp/>

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298

