

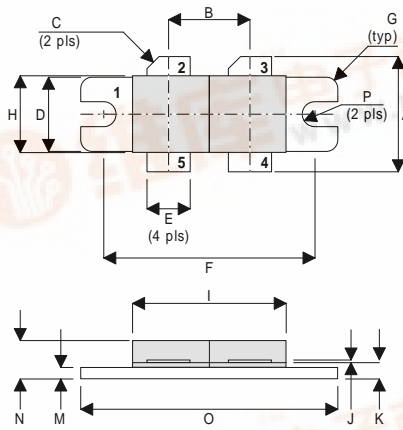
TetraFET

D1009UK

METAL GATE RF SILICON FET

MECHANICAL DATA

**GOLD METALLISED  
MULTI-PURPOSE SILICON  
DMOS RF FET  
150W – 28V – 500MHz  
PUSH-PULL**



DR

PIN 1 SOURCE (COMMON)      PIN 2 DRAIN 1  
PIN 3 DRAIN 2                  PIN 4 GATE 2  
PIN 5 GATE 1

FEATURES

- SIMPLIFIED AMPLIFIER DESIGN
- SUITABLE FOR BROAD BAND APPLICATIONS
- LOW  $C_{rss}$
- SIMPLE BIAS CIRCUITS
- LOW NOISE
- HIGH GAIN – 8 dB MINIMUM

APPLICATIONS

- HF/VHF/UHF COMMUNICATIONS  
from 1 MHz to 500 MHz

DIM	Millimetres	Tol.	Inches	Tol.
A	19.05	0.50	0.75	0.020
B	10.77	0.13	0.424	0.005
C	45°	5°	45°	5°
D	9.78	0.13	0.385	0.005
E	5.71	0.13	0.225	0.005
F	27.94	0.13	1.100	0.005
G	1.52R	0.13	0.060R	0.005
H	10.16	0.13	0.400	0.005
I	22.22	MAX	0.875	MAX
J	0.13	0.02	0.005	0.001
K	2.72	0.13	0.107	0.005
M	1.70	0.13	0.067	0.005
N	5.08	0.50	0.200	0.020
O	34.03	0.13	1.340	0.005
P	1.57R	0.08	0.062R	0.003

**ABSOLUTE MAXIMUM RATINGS** ( $T_{case} = 25^{\circ}C$  unless otherwise stated)

$P_D$	Power Dissipation	389W
$BV_{DSS}$	Drain – Source Breakdown Voltage *	70V
$BV_{GSS}$	Gate – Source Breakdown Voltage *	±20V
$I_{D(sat)}$	Drain Current *	20A
$T_{stg}$	Storage Temperature	-65 to 150°C
	Maximum Operating Junction Temperature	200°C



## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25°C unless otherwise stated)

Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>PER SIDE</b>					
BV <sub>DSS</sub>	Drain–Source Breakdown Voltage	V <sub>GS</sub> = 0	I <sub>D</sub> = 100mA	70	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 28V	V <sub>GS</sub> = 0		4 mA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = 20V	V <sub>DS</sub> = 0		1 μA
V <sub>GS(th)</sub>	Gate Threshold Voltage*	I <sub>D</sub> = 10mA	V <sub>DS</sub> = V <sub>GS</sub>	1	7 V
g <sub>fs</sub>	Forward Transconductance*	V <sub>DS</sub> = 10V	I <sub>D</sub> = 5A	3.2	S
<b>TOTAL DEVICE</b>					
G <sub>PS</sub>	Common Source Power Gain	P <sub>O</sub> = 150W		8	dB
η	Drain Efficiency	V <sub>DS</sub> = 28V	I <sub>DQ</sub> = 2A	50	%
VSWR	Load Mismatch Tolerance	f = 400MHz		20:1	—
<b>PER SIDE</b>					
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 0	V <sub>GS</sub> = -5V f = 1MHz		240 pF
C <sub>oss</sub>	Output Capacitance	V <sub>DS</sub> = 28V	V <sub>GS</sub> = 0 f = 1MHz		100 pF
C <sub>rss</sub>	Reverse Transfer Capacitance	V <sub>DS</sub> = 28V	V <sub>GS</sub> = 0 f = 1MHz		10 pF

\* Pulse Test: Pulse Duration = 300 μs , Duty Cycle ≤ 2%

## HAZARDOUS MATERIAL WARNING

The ceramic portion of the device between leads and metal flange is beryllium oxide. Beryllium oxide dust is highly toxic and care must be taken during handling and mounting to avoid damage to this area.

**THESE DEVICES MUST NEVER BE THROWN AWAY WITH GENERAL INDUSTRIAL OR DOMESTIC WASTE.**

## THERMAL DATA

R <sub>THj-case</sub>	Thermal Resistance Junction – Case	Max. 0.45°C / W
-----------------------	------------------------------------	-----------------

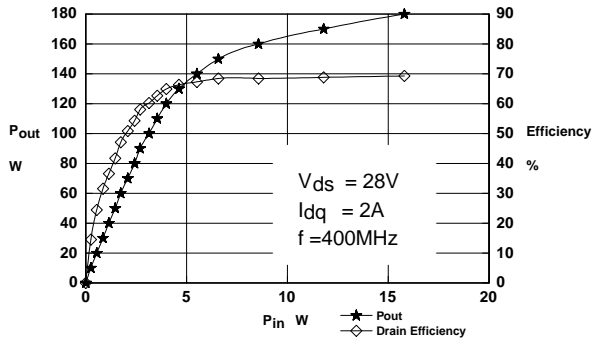


Figure 1 – Power Output and Efficiency vs. Power Input.

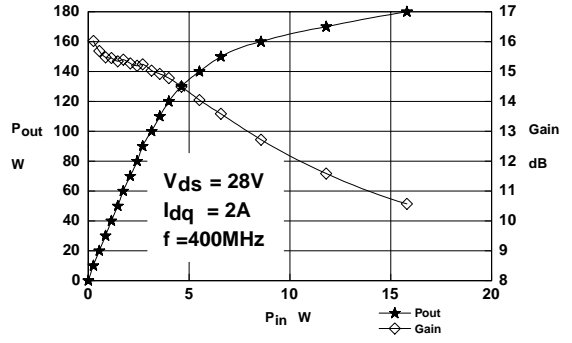


Figure 2 – Power Output & Gain vs. Power Input.

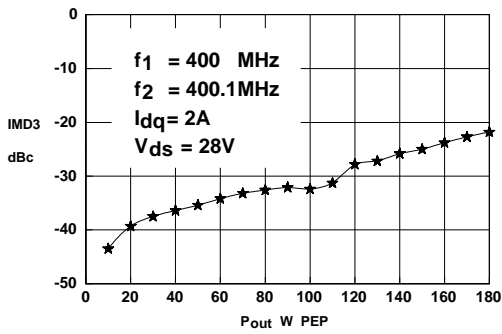


Figure 3 – IMD vs. Output Power.

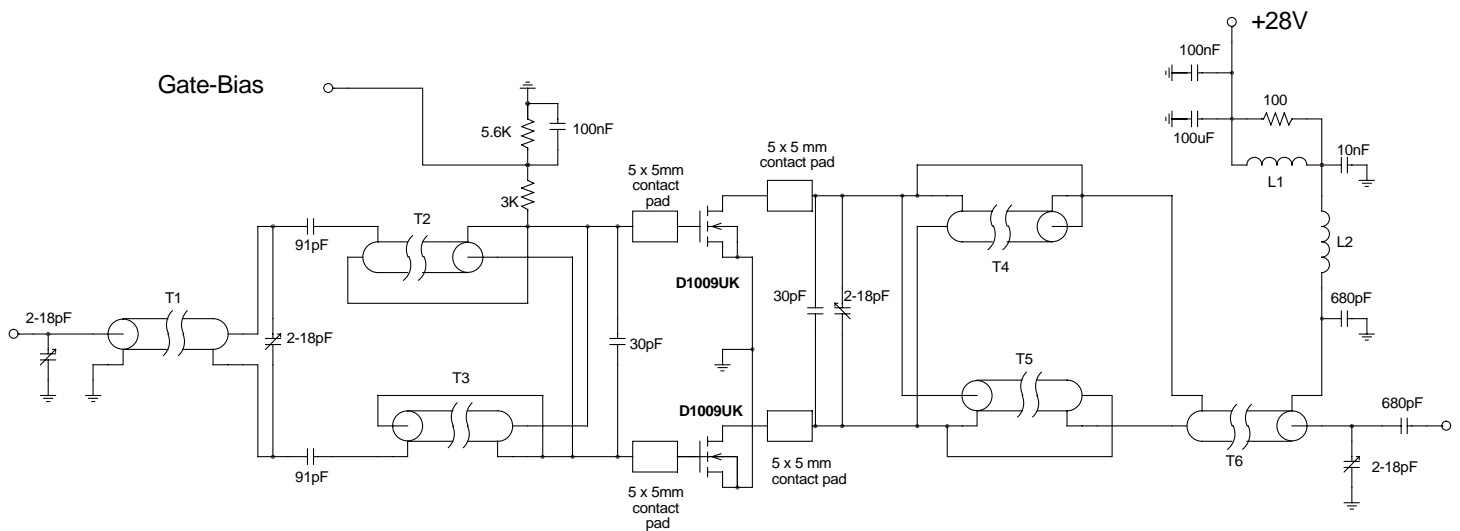
D1009UK  
OPTIMUM SOURCE AND LOAD IMPEDANCE

Frequency MHz	Z <sub>S</sub> Ω	Z <sub>L</sub> Ω
400	1.7 + j0.1	2.7 + j1

**Typical S Parameters**

! Vds=28V      Idq=1A per side  
# MHZ S MA R 50

!Freq !MHz	S11		S21		S12		S22	
	mag	ang	mag	ang	mag	ang	mag	ang
20	0.729	-173.6	20.47	103.6	0.011	25	0.557	-172.3
30	0.72	-172.9	20.57	97.4	0.012	13.7	0.5664	-169.2
40	0.725	-171.7	18.45	91.1	0.012	7.4	0.5848	-167.8
50	0.745	-171.5	14.74	85.1	0.011	3.1	0.6097	-165.5
60	0.758	-170.7	12.21	79.6	0.011	0.7	0.6365	-164.4
70	0.773	-171	10.35	75.6	0.01	-1.1	0.6634	-163.7
80	0.794	-170.6	8.943	70.5	0.01	-2.4	0.6935	-163.8
90	0.81	-170.6	7.829	65.7	0.009	-3.2	0.712	-164
100	0.831	-170.9	6.878	61.9	0.009	-2.6	0.734	-163.6
110	0.841	-171.4	6.107	58.6	0.008	-2.4	0.7559	-164
120	0.852	-171.8	5.449	54.9	0.007	-1	0.7685	-164.8
130	0.862	-172.1	4.877	52.4	0.007	1.9	0.7902	-165.2
140	0.871	-172.6	4.373	48.8	0.006	4.8	0.8089	-166
150	0.885	-173.1	3.949	46.1	0.006	8.8	0.8248	-165.9
160	0.895	-173.5	3.574	42.4	0.006	13.8	0.8333	-166.9
170	0.901	-174.1	3.246	40.4	0.005	19.7	0.8413	-167.7
180	0.905	-175.2	2.948	38.5	0.005	26.8	0.8512	-168.5
190	0.911	-175	2.688	36.6	0.005	35.5	0.8696	-168.5
200	0.915	-175.8	2.486	36	0.005	42.5	0.871	-169.4
210	0.922	-175.8	2.313	35	0.006	50.3	0.8817	-169.4
220	0.933	-176.4	2.16	33.7	0.006	56.4	0.8865	-170.3
230	0.927	-176.4	2.013	31.9	0.006	60.1	0.8966	-171
240	0.93	-177.3	1.866	29.5	0.007	62.9	0.8999	-171.5
250	0.938	-177.2	1.729	27.4	0.007	66.7	0.9096	-171.4
260	0.939	-178.4	1.617	26.1	0.008	70.8	0.9101	-172.3
270	0.94	-178.6	1.502	24.8	0.008	73.5	0.9152	-172.5
280	0.942	-179	1.433	24.5	0.009	76.7	0.9159	-173
290	0.95	-179.9	1.359	25.1	0.01	80.4	0.923	-173.6
300	0.944	-179.3	1.3	24.1	0.011	81.3	0.9216	-173.9
310	0.951	-179.5	1.238	22.3	0.012	81.5	0.9297	-174.8
320	0.952	-179.6	1.184	20.4	0.012	80.4	0.9345	-174.8
330	0.954	-179.9	1.115	18.3	0.013	79	0.9344	-175.4
340	0.963	-179.2	1.04	15.7	0.013	77.5	0.9394	-175.6
350	0.953	-178.9	0.964	13.8	0.014	77.5	0.9382	-176.2
360	0.96	-178.3	0.9	13	0.014	78.1	0.943	-176.2
370	0.96	-178.4	0.847	13.1	0.015	78.6	0.9437	-176.8
380	0.96	-177.7	0.802	13.1	0.015	79.6	0.9458	-176.9
390	0.963	-177.5	0.744	12.6	0.015	78.6	0.9475	-177.2
400	0.964	-177	0.704	16.9	0.015	82.9	0.9492	-177.5
410	0.966	-176.5	0.721	16.3	0.017	84	0.9527	-177.3
420	0.964	-176.8	0.704	14.6	0.018	83.1	0.9499	-178.2
430	0.965	-176.5	0.677	12.1	0.018	81.8	0.9556	-178.2
440	0.965	-175.6	0.64	10.3	0.019	80.5	0.9593	-178.8
450	0.967	-175.3	0.605	9.7	0.019	81	0.9546	-179
460	0.968	-175.1	0.576	8.8	0.019	81.2	0.9598	-179.7
470	0.967	-175.2	0.552	9.4	0.02	82.4	0.9599	-179.4
480	0.966	-174.8	0.53	9.7	0.02	83.6	0.9608	-179.9
490	0.967	-174.3	0.512	9.4	0.021	83.2	0.9604	-179.8
500	0.967	-173.9	0.503	9.5	0.022	83.8	0.9596	-179.5



## D1009UK TEST FIXTURE

Substrate 1.6mm PTFE/ glass,  $\epsilon_r = 2.5$   
All microstrip lines  $W = 4.4\text{mm}$

T1	12cm	50 $\Omega$ UT85 semi-rigid coax on ferrite core
T2,3	7.5cm	15 $\Omega$ UT85-15 semi-rigid coax
T4,5	7cm	15 $\Omega$ UT85-15 semi-rigid coax
T6	11cm	50 $\Omega$ UT85 semi-rigid coax on ferrite core
L1	6.5 turns 25swg enamelled copper wire on Fair-Rite FT50B-43 core	
L2	6.5 turns 25swg enamelled copper wire, 4mm internal diameter	