

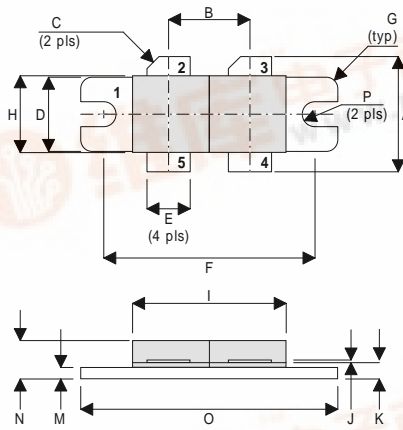
TetraFET

D1010UK

METAL GATE RF SILICON FET

MECHANICAL DATA

**GOLD METALLISED
MULTI-PURPOSE SILICON
DMOS RF FET
125W – 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 – 10 dB MINIMUM

APPLICATIONS

- HF/VHF/UHF COMMUNICATIONS
from 1 MHz to 400 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 | 350W |
| 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_{case} = 25°C unless otherwise stated)

| Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|---------------------------------|-----------------------|-----------------------------------|------|--------|
| PER SIDE | | | | | |
| BV _{DSS} | Drain–Source Breakdown Voltage | V _{GS} = 0 | I _D = 100mA | 70 | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 28V | V _{GS} = 0 | | 4 mA |
| I _{GSS} | Gate Leakage Current | V _{GS} = 20V | V _{DS} = 0 | | 1 μA |
| V _{GS(th)} | Gate Threshold Voltage* | I _D = 10mA | V _{DS} = V _{GS} | 1 | 7 V |
| g _{fs} | Forward Transconductance* | V _{DS} = 10V | I _D = 5A | 3.2 | S |
| TOTAL D | | | | | |
| G _{PS} | Common Source Power Gain | P _O = 125W | | 10 | dB |
| η | Drain Efficiency | V _{DS} = 28V | I _{DQ} = 2A | 50 | % |
| VSWR | Load Mismatch Tolerance | f = 400MHz | | 20:1 | — |
| PER SIDE | | | | | |
| C _{iss} | Input Capacitance | V _{DS} = 0 | V _{GS} = -5V f = 1MHz | | 240 pF |
| C _{oss} | Output Capacitance | V _{DS} = 28V | V _{GS} = 0 f = 1MHz | | 120 pF |
| C _{rss} | Reverse Transfer Capacitance | V _{DS} = 28V | V _{GS} = 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 _{THj-case} | Thermal Resistance Junction – Case | Max. 0.5°C / W |
|-----------------------|------------------------------------|----------------|

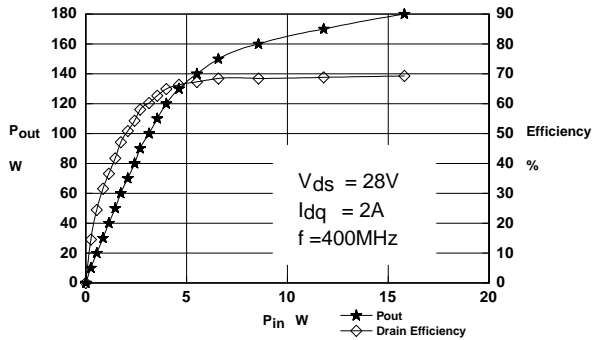


Figure 1 – Power Output and Efficiency vs. Power Input.

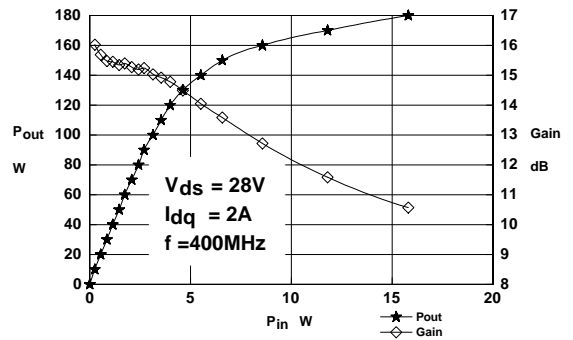


Figure 2 – Power Output & Gain vs. Power Input.

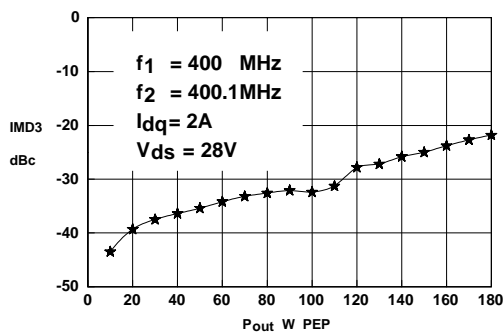


Figure 3 – IMD vs. Output Power.

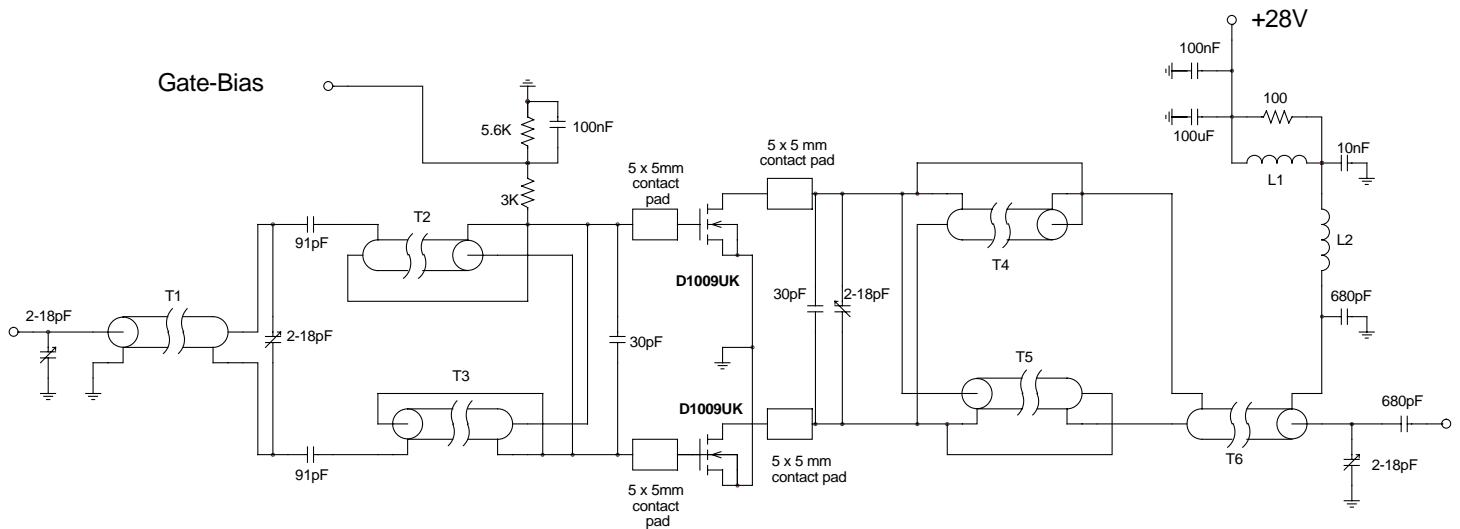
D1010UK OPTIMUM SOURCE AND LOAD IMPEDANCE

| Frequency MHz | Z_S Ω | Z_L 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 |



D1010UK TEST FIXTURE

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

| | | |
|------|--|--|
| T1 | 12cm | 50 Ω UT85 semi-rigid coax on ferrite core |
| T2,3 | 7.5cm | 15 Ω UT85-15 semi-rigid coax |
| T4,5 | 7cm | 15 Ω UT85-15 semi-rigid coax |
| T6 | 11cm | 50 Ω 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 | |