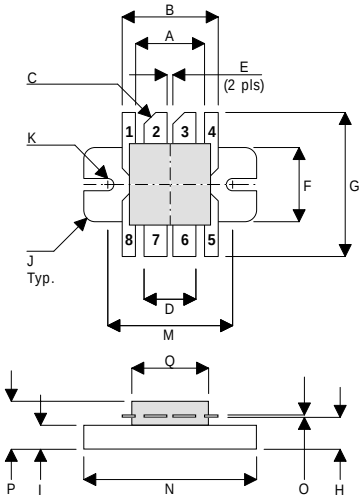
TetraFET

# D1018UK

## ROHS COMPLIANT METAL GATE RF SILICON FET

### MECHANICAL DATA




**DD**

| | | | |
|---|---|---|---|
| PIN 1 | SOURCE (COMMON) | PIN 2 | DRAIN 1 |
| PIN 3 | DRAIN 2 | PIN 4 | SOURCE (COMMON) |
| PIN 5 | SOURCE (COMMON) | PIN 6 | GATE 2 |
| PIN 7 | GATE 1 | PIN 8 | SOURCE (COMMON) |

| DIM | mm | Tol. | Inches | Tol. |
|---|---|---|---|---|
| A | 9.14 | 0.13 | 0.360 | 0.005 |
| B | 12.70 | 0.13 | 0.500 | 0.005 |
| C | 45° | 5° | 45° | 5° |
| D | 6.86 | 0.13 | 0.270 | 0.005 |
| E | 0.76 | 0.13 | 0.030 | 0.005 |
| F | 9.78 | 0.13 | 0.385 | 0.005 |
| G | 19.05 | 0.25 | 0.750 | 0.010 |
| H | 4.19 | 0.13 | 0.165 | 0.005 |
| I | 3.17 | 0.13 | 0.125 | 0.005 |
| J | 1.52R | 0.13 | 0.060R | 0.005 |
| K | 1.65R | 0.13 | 0.065R | 0.005 |
| M | 16.51 | 0.13 | 0.650 | 0.005 |
| N | 22.86 | 0.13 | 0.900 | 0.005 |
| O | 0.13 | 0.02 | 0.005 | 0.001 |
| P | 6.35 | 0.64 | 0.250 | 0.025 |
| Q | 10.77 | 0.13 | 0.424 | 0.005 |

# GOLD METALLISED MULTI-PURPOSE SILICON DMOS RF FET 100W – 28V – 500MHz PUSH–PULL

## 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 500 MHz

## ABSOLUTE MAXIMUM RATINGS ($T_{case}$ = 25° C unless otherwise stated)

| | | |
|---|---|---|
| $P_D$ | Power Dissipation | 250W |
| $BV_{DSS}$ | Drain – Source Breakdown Voltage * | 70V |
| $BV_{GSS}$ | Gate – Source Breakdown Voltage * | ±20V |
| $I_{D(sat)}$ | Drain Current * | 15A |
| $T_{stg}$ | Storage Temperature | –65 to 150°C |
| $T_j$ | Maximum Operating Junction Temperature | 200°C |

* Per Side



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## 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 | | | 3 | 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 | $I_D$ = 3A | 2.4 | | | S |
| **TOTAL DEVICE** | | | | | | | |
| $G_{PS}$ | Common Source Power Gain | $P_O$ = 100W | | 10 | | | dB |
| η | Drain Efficiency | $V_{DS}$ = 28V | $I_{DQ}$ = 1.2A | 50 | | | % |
| VSWR | Load Mismatch Tolerance | f = 500MHz | | 20:1 | | | — |
| **PER SIDE** | | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = –5V f = 1MHz | | | 180 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = 0 f = 1MHz | | | 90 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = 0 f = 1MHz | | | 7.5 | 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. 0.7° C / W |



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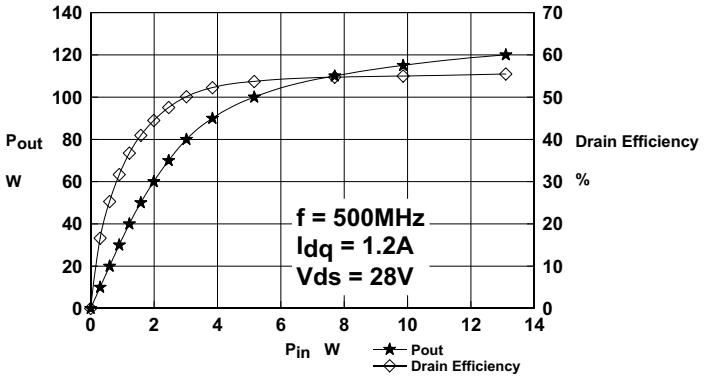


**Figure 1**
Power Output and Efficiency vs Input Power

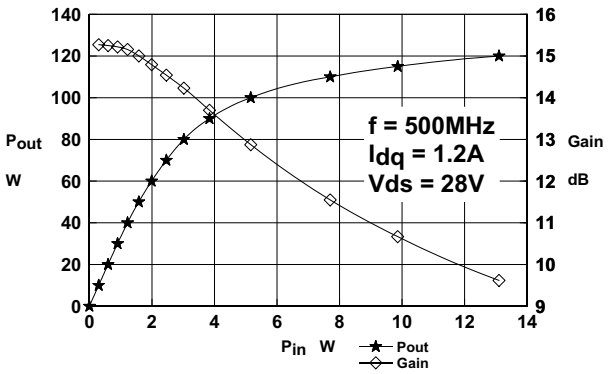


**Figure 2**
Power Output and Gain vs Input Power

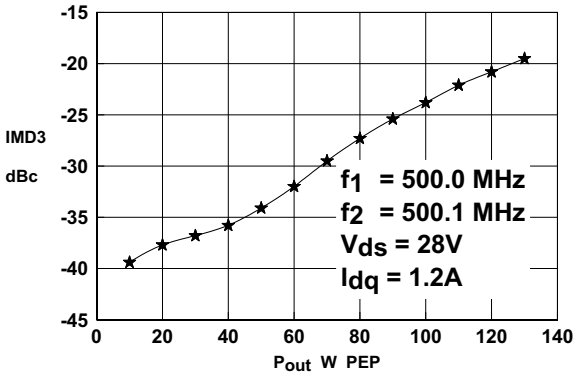


**Figure 3**
IMD vs. Output Power

## OPTIMUM SOURCE AND LOAD IMPEDANCE

| Frequency MHz | $Z_S$ Ω | $Z_L$ Ω |
|---|---|---|
| 500 | 2.0 - j2.2 | 2.6 - j0.6 |

**N.B. Impedances measured terminal to terminal**



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## Typical S Parameters

! Vds=28V, Idq=0.3A
# MHZ S MA R 50

| !Freq | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| !MHz | mag | ang | mag | ang | mag | ang | mag | ang |
| 100 | 0.86 | -157.3 | 5.98 | 55.7 | 0.01 | 20.3 | 0.73 | -139.7 |
| 150 | 0.9 | -163.2 | 3.22 | 43.1 | 0.01 | 78 | 0.82 | -149.7 |
| 200 | 0.93 | -167.9 | 1.98 | 36.9 | 0.02 | 98.2 | 0.88 | -156.3 |
| 250 | 0.95 | -170.4 | 1.39 | 31 | 0.03 | 101 | 0.91 | -160.2 |
| 300 | 0.95 | -172.7 | 1.1 | 29.6 | 0.05 | 103.7 | 0.93 | -163.6 |
| 350 | 0.96 | -174.5 | 0.82 | 23.9 | 0.06 | 99.9 | 0.94 | -166.1 |
| 400 | 0.96 | -176.2 | 0.69 | 23.9 | 0.08 | 100.2 | 0.95 | -168.1 |
| 450 | 0.97 | -177.5 | 0.55 | 22.1 | 0.09 | 98.3 | 0.96 | -170.1 |
| 500 | 0.97 | -179.4 | 0.51 | 21 | 0.11 | 95.6 | 0.97 | -171.6 |
| 550 | 0.97 | 179.8 | 0.43 | 19.1 | 0.13 | 90.8 | 0.97 | -173.3 |
| 600 | 0.96 | 178.8 | 0.4 | 15.1 | 0.15 | 82 | 0.97 | -174.5 |
| 650 | 0.98 | 177.5 | 0.35 | 15.8 | 0.17 | 83.5 | 0.98 | -175.7 |
| 700 | 0.99 | 175.4 | 0.31 | 11 | 0.19 | 76.8 | 1 | -178.4 |
| 750 | 0.99 | 173 | 0.27 | 14.2 | 0.21 | 75.1 | 1.01 | 178.8 |
| 800 | 1 | 170.5 | 0.24 | 16.6 | 0.22 | 71.5 | 1 | 176.1 |
| 850 | 0.99 | 168.1 | 0.24 | 22.7 | 0.25 | 72.6 | 0.99 | 173.3 |
| 900 | 1 | 166.1 | 0.24 | 23.7 | 0.3 | 68.8 | 0.99 | 170.6 |
| 950 | 1 | 163.9 | 0.25 | 23.2 | 0.34 | 62.7 | 0.97 | 167.7 |
| 1000 | 0.99 | 161.6 | 0.25 | 21.7 | 0.37 | 56.4 | 0.96 | 166.1 |



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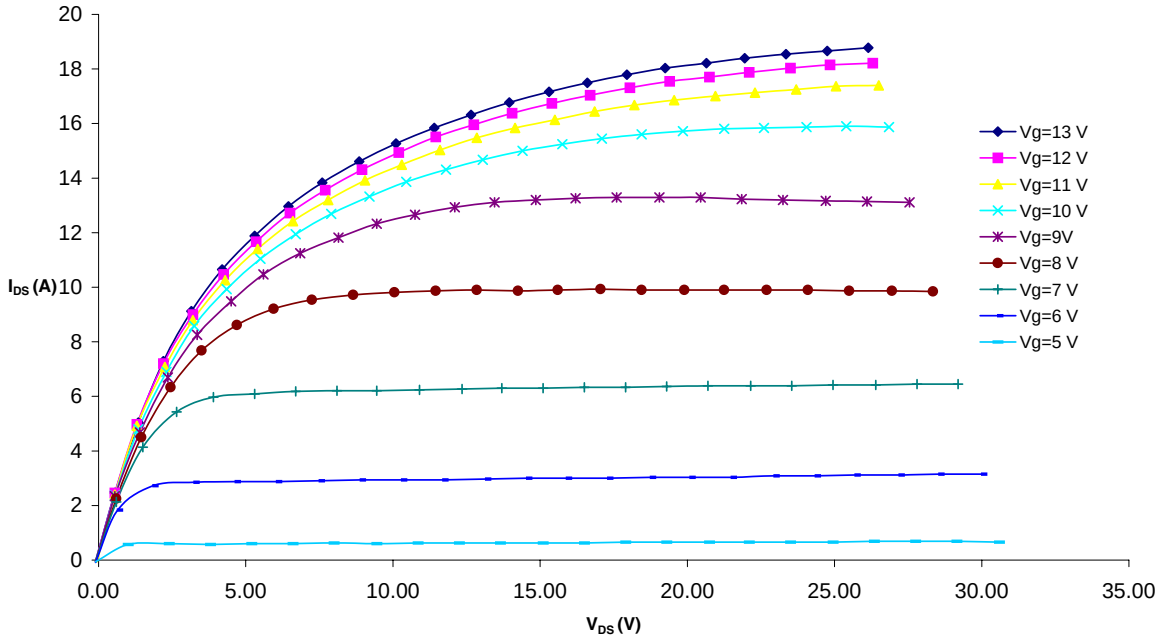


**Figure 4 – Typical IV Characteristics.**

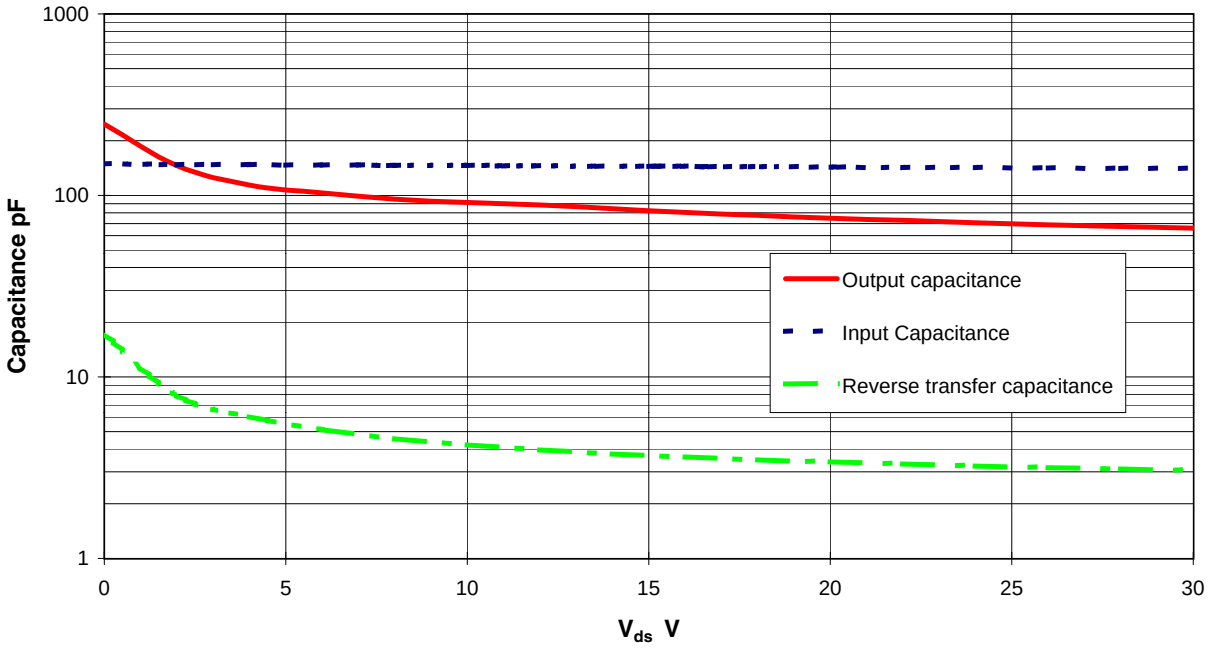


**Figure 5 – Typical CV Characteristics.**



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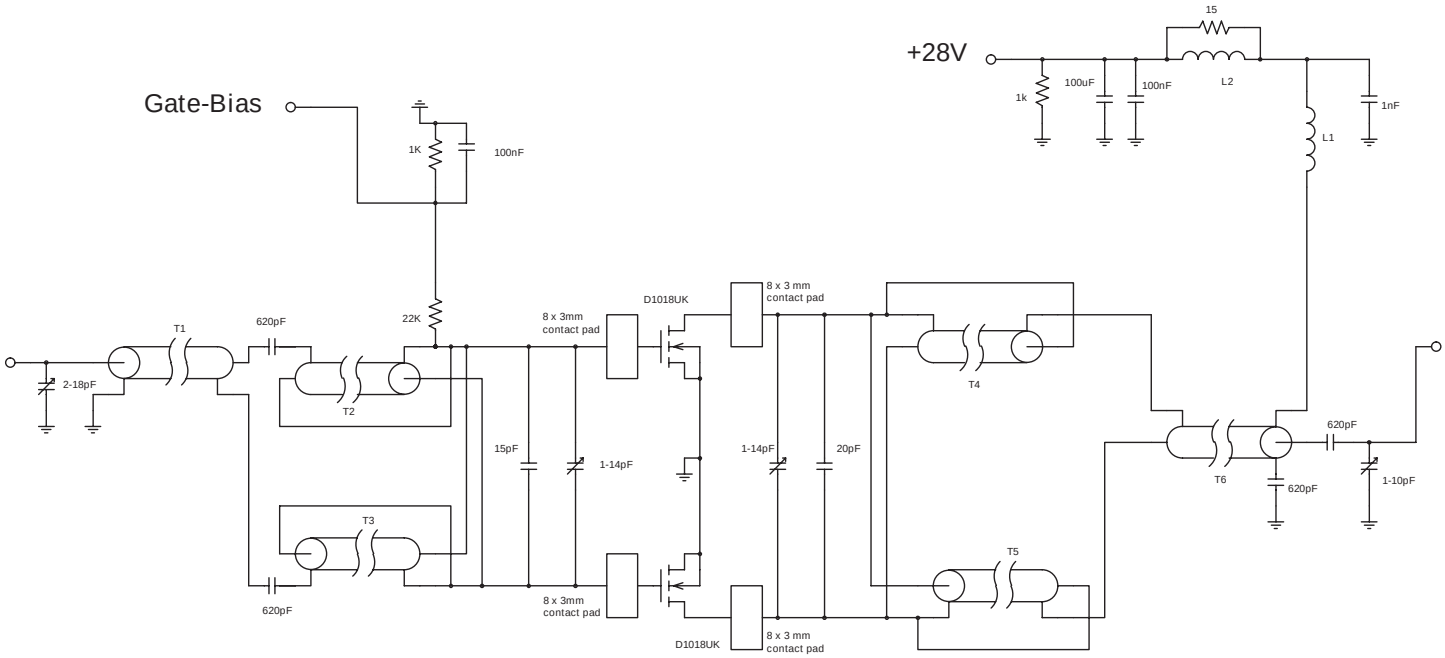


## 500MHz TEST FIXTURE

| | |
|---|---|
| **T1,6** | **65mm 50ohm UT85 semi-rigid coax** |
| **T2,3,4,5** | **75mm 15 ohm UT85-15 semi-rigid coax** |
| **L1** | **6 turns 21 swg enamelled copper wire, 3mm id.** |
| **L2** | **8.5 turns 19swg enamelled copper wire on Fair-Rite FT82-43 core** |
| **T6** | **Placed through Ferronics 12-360-K ferrite bead** |



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