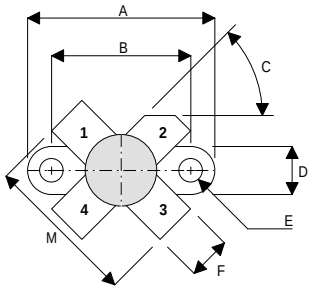
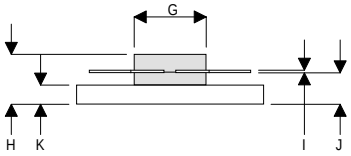
# D1001UK

## ROHS COMPLIANT METAL GATE RF SILICON FET

### MECHANICAL DATA




DA

| | | | |
|---|---|---|---|
| PIN 1 | SOURCE | PIN 2 | DRAIN |
| PIN 3 | SOURCE | PIN 4 | GATE |

| DIM | mm | Tol. | Inches | Tol. |
|---|---|---|---|---|
| A | 24.76 | 0.13 | 0.975 | 0.005 |
| B | 18.42 | 0.13 | 0.725 | 0.005 |
| C | 45° | 5° | 45° | 5° |
| D | 6.35 | 0.13 | 0.25 | 0.005 |
| E | 3.17 | 0.13 | 0.125 DIA | 0.005 |
| F | 5.71 | 0.13 | 0.225 | 0.005 |
| G | 9.52 | 0.13 | 0.375 | 0.005 |
| H | 6.60 | REF | 0.260 | REF |
| I | 0.13 | 0.02 | 0.005 | 0.001 |
| J | 4.32 | 0.13 | 0.170 | 0.005 |
| K | 2.54 | 0.13 | 0.100 | 0.005 |
| M | 20.32 | 0.25 | 0.800 | 0.010 |

# GOLD METALLISED MULTI-PURPOSE SILICON DMOS RF FET 20W – 28V – 175MHz SINGLE ENDED

## FEATURES

- **SIMPLIFIED AMPLIFIER DESIGN**
- **SUITABLE FOR BROAD BAND APPLICATIONS**
- **LOW $C_{rss}$**
- **SIMPLE BIAS CIRCUITS**
- **LOW NOISE**
- **HIGH GAIN – 16 dB MINIMUM**

## APPLICATIONS

- HF/VHF/UHF COMMUNICATIONS from 1 MHz to 175 MHz

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

| | | |
|---|---|---|
| $P_D$ | Power Dissipation | 50W |
| $BV_{DSS}$ | Drain – Source Breakdown Voltage | 70V |
| $BV_{GSS}$ | Gate – Source Breakdown Voltage | ±20V |
| $I_{D(sat)}$ | Drain Current | 5A |
| $T_{stg}$ | Storage Temperature | –65 to 150°C |
| $T_j$ | Maximum Operating Junction Temperature | 200°C |



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Issue 1

# D1001UK

## ELECTRICAL CHARACTERISTICS ($T_{case}$ = 25°C unless otherwise stated)

| Parameter | | Test Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $BV_{DSS}$ | 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 | | | 1 | 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 | $I_D$ = 1A | 0.8 | | | S |
| $G_{PS}$ | Common Source Power Gain | $P_O$ = 20W | | 16 | | | dB |
| η | Drain Efficiency | $V_{DS}$ = 28V | $I_{DQ}$ = 0.1A | 50 | | | % |
| VSWR | Load Mismatch Tolerance | f = 175MHz | | 20:1 | | | — |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = –5V f = 1MHz | | | 60 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = 0 f = 1MHz | | | 30 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | $V_{DS}$ = 28V | $V_{GS}$ = 0 f = 1MHz | | | 2.5 | pF |
| $R_{dson}$ | Saturation Resistance | $V_{GS}$ = 20V | $I_{DS}$ = 2.5A | | 1 | | Ω |

* 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. 3.5°C / W |



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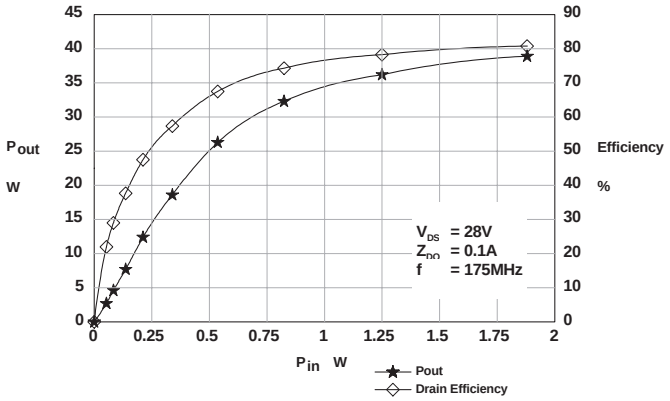


**Figure 1 – Power Output and Efficiency vs. Power Input.**

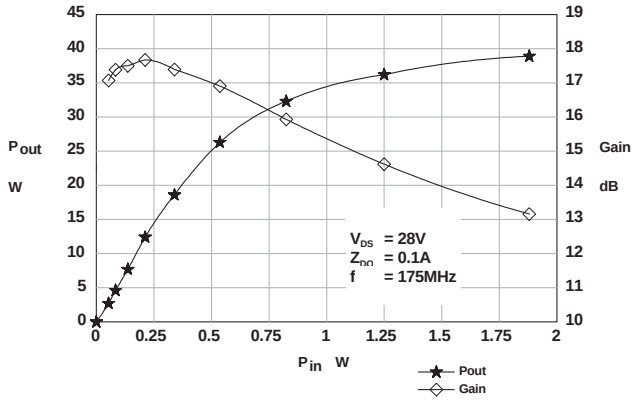


**Figure 2 – Power Output & Gain vs. Power Input.**

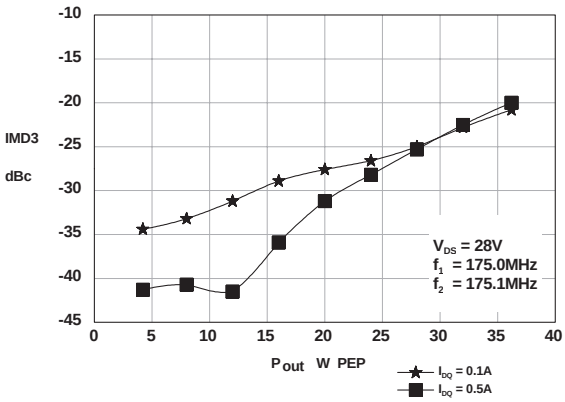


**Figure 3 – IMD vs. Output Power.**

## D1001UK
## OPTIMUM SOURCE AND LOAD IMPEDANCE

| Frequency MHz | $Z_S$ Ω | $Z_L$ Ω |
|---|---|---|
| 175MHz | 5 + j14 | 12 – j14 |

## Typical S Parameters

! $V_{DS}$ = 28V, $I_{DQ}$ = 0.1A

# MHZ S MA R 50

| !Freq MHz | S11 mag | S11 ang | S21 mag | S21 ang | S12 mag | S12 ang | S22 mag | S22 ang |
|---|---|---|---|---|---|---|---|---|
| 50 | 0.780 | -116 | 18 | 112 | 0.034 | 25 | 0.642 | -85 |
| 100 | 0.775 | -135 | 9.312 | 85 | 0.030 | 11 | 0.577 | -103 |
| 150 | 0.795 | -149 | 6.077 | 68 | 0.022 | 14 | 0.613 | -116 |
| 200 | 0.826 | -159 | 4.193 | 53 | 0.017 | 44 | 0.669 | -128 |
| 250 | 0.853 | -169 | 3.216 | 43 | 0.023 | 74 | 0.715 | -139 |
| 300 | 0.878 | -179 | 2.566 | 35 | 0.039 | 89 | 0.759 | -150 |
| 350 | 0.903 | 171 | 1.991 | 23 | 0.052 | 86 | 0.801 | -161 |
| 400 | 0.923 | 161 | 1.655 | 18 | 0.070 | 84 | 0.839 | -173 |
| 450 | 0.944 | 151 | 1.322 | 9 | 0.080 | 80 | 0.878 | 177 |
| 500 | 0.963 | 142 | 1.121 | 4 | 0.098 | 76 | 0.914 | 167 |
| 550 | 0.978 | 136 | 0.899 | -2 | 0.108 | 72 | 0.945 | 159 |
| 600 | 0.985 | 131 | 0.762 | -7 | 0.119 | 66 | 0.966 | 153 |



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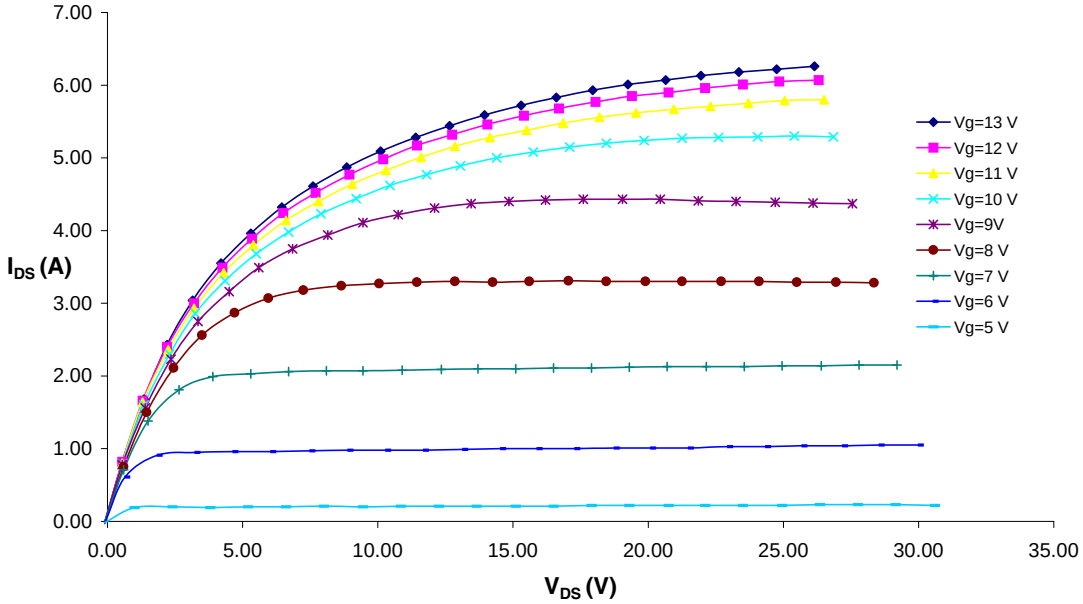


**Figure 4 – Typical IV Characteristics.**

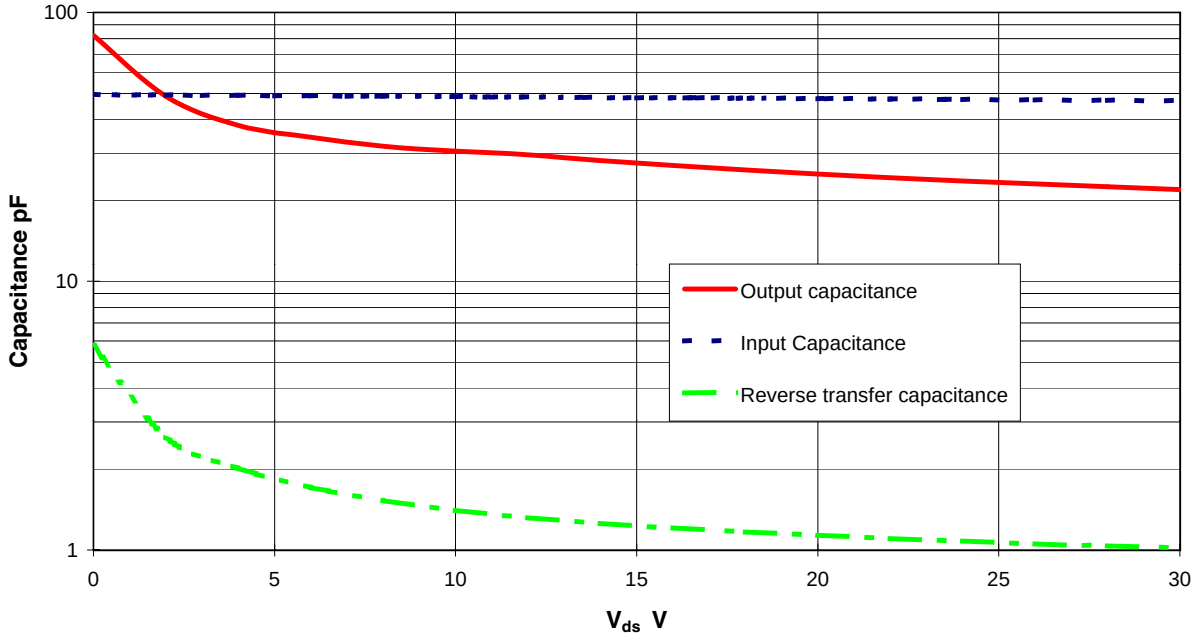


**Figure 5 – Typical CV Characteristics.**



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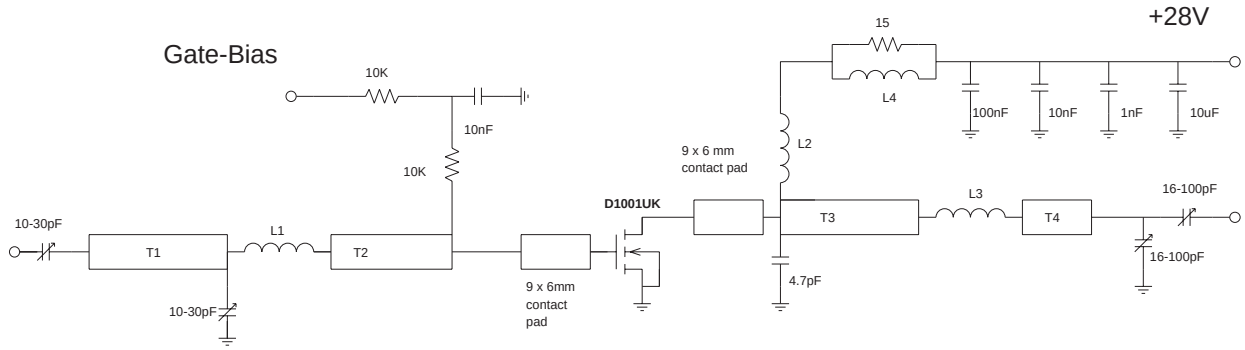


# D1001UK 175MHz TEST FIXTURE

Substrate 1.6mm PTFE/glass, Er=2.5
All microstrip lines W=4.4mm

| | |
|---|---|
| T1 | 10mm |
| T2 | 13mm |
| T3 | 12mm |
| T4 | 4mm |

| | |
|---|---|
| L1 | 1.5 turns 22swg enamelled copper wire, 6mm i.d. |
| L2 | 10 turns 19swg enamelled copper wire, 6mm i.d. |
| L3 | 1.5 turns 22swg enamelled copper wire, 6mm i.d. |
| L4 | 13.5 turns 19swg enamelled copper wire on Siemens B64920A618X830 ferrite core |



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