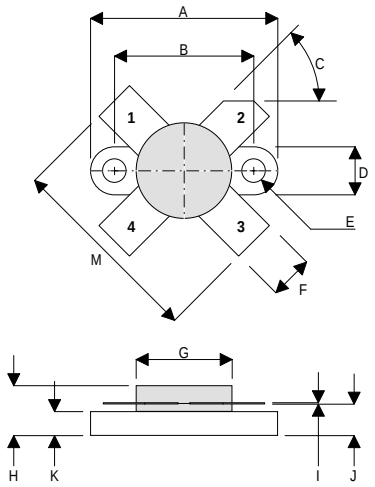
TetraFET

# D5017UK

## METAL GATE RF SILICON FET

### MECHANICAL DATA




**DM**

| | | | |
|---|---|---|---|
| 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 Dia. | 0.13 | 0.125 Dia. | 0.005 |
| F | 5.71 | 0.13 | 0.225 | 0.005 |
| G | 12.7 Dia. | 0.13 | 0.500 Dia. | 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 | 3.17 | 0.13 | 0.125 | 0.005 |
| M | 26.16 | 0.25 | 1.03 | 0.010 |

# GOLD METALLISED MULTI-PURPOSE SILICON DMOS RF FET 150W – 50V – 175MHz SINGLE ENDED

## 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 175 MHz

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

| | | |
|---|---|---|
| $P_D$ | Power Dissipation | 220W |
| $BV_{DSS}$ | Drain – Source Breakdown Voltage | 125V |
| $BV_{GSS}$ | Gate – Source Breakdown Voltage | ±20V |
| $I_{D(sat)}$ | Drain Current | 18A |
| $T_{stg}$ | Storage Temperature | –65 to 150°C |
| $T_j$ | Maximum Operating Junction Temperature | 200°C |



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## 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 | | 125 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 50V | $V_{GS}$ = 0 | | | | 6 | 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 | | 4.8 | | | S |
| $G_{PS}$ | Common Source Power Gain | $P_O$ = 150W | | | 10 | | | dB |
| η | Drain Efficiency | $V_{DS}$ = 50V | $I_{DQ}$ = 0.6A | | 50 | | | % |
| VSWR | Load Mismatch Tolerance | f = 175MHz | | | 20:1 | | | — |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 50V | $V_{GS}$ = –5V | f = 1MHz | | | 360 | pF |
| $C_{oss}$ | Output Capacitance | $V_{DS}$ = 50V | $V_{GS}$ = 0 | f = 1MHz | | | 150 | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | $V_{DS}$ = 50V | $V_{GS}$ = 0 | f = 1MHz | | | 9 | 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. 0.8°C / W |



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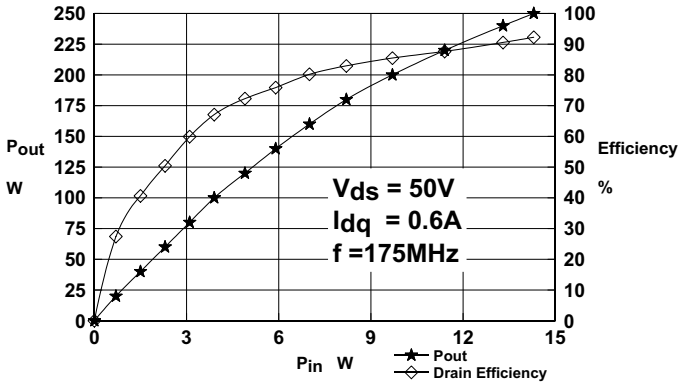


**Figure 1**
Power Output & Efficiency vs. Power Input

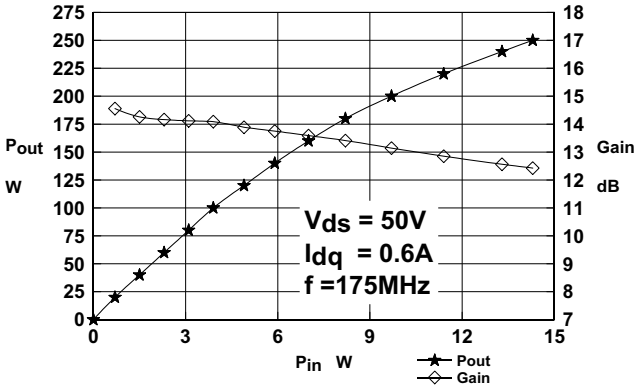


**Figure 2**
Power Output and Gain vs. Power Input

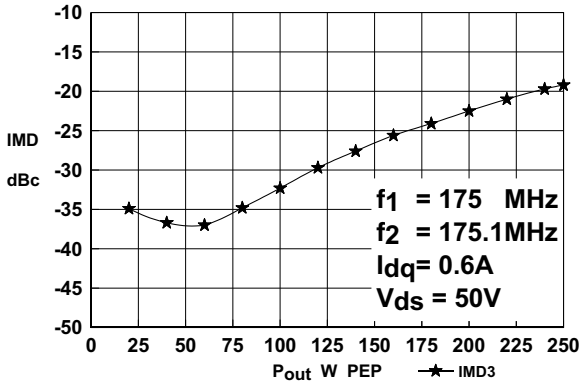


**Figure 3**
IMD3 vs Power Output

## OPTIMUM SOURCE AND LOAD IMPEDANCE

| Frequency MHz | $Z_S$ Ω | $Z_L$ Ω |
|---|---|---|
| 175 | 2.6 + j1.8 | 4 + j1.2 |



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## Typical S Parameters

! Vds=50V Idq=0.6A
# MHZ S MA R 50

| !Freq | S11 | | S21 | | S12 | | S22 | |
|---|---|---|---|---|---|---|---|---|
| !Mhz | mag | ang | mag | ang | mag | ang | mag | ang |
| 60 | 0.918 | -167.2 | 5.927 | 98.5 | 0.01 | 29.1 | 0.713 | -157.5 |
| 70 | 0.916 | -168.2 | 5.073 | 91.8 | 0.01 | 29.2 | 0.713 | -156.7 |
| 80 | 0.918 | -168.7 | 4.541 | 86.3 | 0.009 | 29.3 | 0.719 | -156.6 |
| 90 | 0.917 | -170.3 | 3.985 | 79.7 | 0.009 | 31.5 | 0.732 | -157.2 |
| 100 | 0.919 | -170.8 | 3.634 | 75.6 | 0.009 | 35.2 | 0.742 | -157.8 |
| 110 | 0.927 | -171.8 | 3.224 | 69.3 | 0.008 | 40 | 0.762 | -158.5 |
| 120 | 0.926 | -172.6 | 2.933 | 65.4 | 0.008 | 45.2 | 0.771 | -159.1 |
| 130 | 0.932 | -173.3 | 2.612 | 61 | 0.008 | 51.9 | 0.79 | -160.1 |
| 140 | 0.934 | -173.7 | 2.384 | 57.1 | 0.009 | 57.5 | 0.799 | -160.9 |
| 150 | 0.936 | -174.8 | 2.136 | 52.9 | 0.009 | 63.2 | 0.815 | -162 |
| 160 | 0.941 | -175.3 | 1.968 | 49.7 | 0.01 | 67.3 | 0.827 | -162.4 |
| 170 | 0.939 | -176.2 | 1.766 | 46.3 | 0.011 | 72.2 | 0.837 | -163.9 |
| 180 | 0.943 | -177 | 1.594 | 43.5 | 0.011 | 76.4 | 0.849 | -164.9 |
| 190 | 0.946 | -177.5 | 1.482 | 42.2 | 0.012 | 80.5 | 0.857 | -165.9 |
| 200 | 0.954 | -177.8 | 1.347 | 39.6 | 0.013 | 82.4 | 0.871 | -166.1 |
| 210 | 0.952 | -178.8 | 1.253 | 39 | 0.014 | 85.4 | 0.881 | -168 |
| 220 | 0.957 | -179.3 | 1.169 | 37.8 | 0.016 | 86.8 | 0.889 | -168.8 |
| 230 | 0.958 | -179.4 | 1.102 | 36 | 0.017 | 87.8 | 0.891 | -169.6 |
| 240 | 0.961 | 179.9 | 1.019 | 33 | 0.018 | 87.9 | 0.9 | -170.6 |
| 250 | 0.965 | 179.2 | 0.957 | 31 | 0.019 | 88 | 0.899 | -171.5 |
| 260 | 0.966 | 178.9 | 0.882 | 29.3 | 0.02 | 88.9 | 0.91 | -172.4 |
| 270 | 0.962 | 178.2 | 0.84 | 28.2 | 0.021 | 89.9 | 0.913 | -173 |
| 280 | 0.965 | 177.8 | 0.786 | 27.1 | 0.023 | 90.1 | 0.922 | -173.3 |
| 290 | 0.969 | 177.5 | 0.733 | 26.7 | 0.024 | 91.1 | 0.927 | -175.3 |
| 300 | 0.97 | 176.6 | 0.703 | 26.6 | 0.026 | 90.8 | 0.93 | -175.2 |
| 310 | 0.97 | 176.6 | 0.669 | 25.3 | 0.027 | 90.2 | 0.934 | -176.2 |
| 320 | 0.971 | 175.8 | 0.638 | 22.5 | 0.028 | 88.2 | 0.938 | -177.1 |
| 330 | 0.972 | 175.7 | 0.598 | 20 | 0.029 | 86.7 | 0.939 | -177.7 |
| 340 | 0.974 | 175 | 0.559 | 19.2 | 0.029 | 86.7 | 0.944 | -178.4 |
| 350 | 0.976 | 175.1 | 0.516 | 17.8 | 0.03 | 87.5 | 0.944 | -179.6 |
| 360 | 0.977 | 173.7 | 0.486 | 17.3 | 0.031 | 88.3 | 0.95 | -180 |
| 370 | 0.976 | 173.3 | 0.455 | 17.8 | 0.032 | 89.6 | 0.952 | 179.3 |
| 380 | 0.975 | 173.4 | 0.437 | 18.2 | 0.034 | 89.8 | 0.952 | 178.4 |
| 390 | 0.977 | 172.8 | 0.413 | 18.8 | 0.035 | 89.5 | 0.958 | 177.5 |
| 400 | 0.976 | 172.2 | 0.402 | 20.5 | 0.037 | 90.4 | 0.959 | 177.7 |
| 410 | 0.979 | 172.2 | 0.396 | 19.4 | 0.039 | 89.6 | 0.962 | 176.3 |
| 420 | 0.978 | 171.6 | 0.377 | 17.6 | 0.04 | 88 | 0.962 | 176.3 |
| 430 | 0.977 | 171.3 | 0.362 | 16 | 0.04 | 86.3 | 0.965 | 175.4 |
| 440 | 0.982 | 170.7 | 0.341 | 14.9 | 0.041 | 86 | 0.966 | 174.5 |
| 450 | 0.979 | 170.4 | 0.327 | 15.1 | 0.041 | 86.4 | 0.966 | 174.4 |
| 460 | 0.978 | 170.5 | 0.31 | 15 | 0.042 | 86.5 | 0.97 | 174 |
| 470 | 0.98 | 169.9 | 0.3 | 15.9 | 0.043 | 87.3 | 0.967 | 173.2 |
| 480 | 0.982 | 169.6 | 0.289 | 16.3 | 0.045 | 87.4 | 0.972 | 172.6 |
| 490 | 0.979 | 169 | 0.28 | 16.5 | 0.046 | 87.7 | 0.968 | 171.7 |
| 500 | 0.98 | 168.8 | 0.271 | 16.6 | 0.047 | 87.4 | 0.969 | 171.7 |



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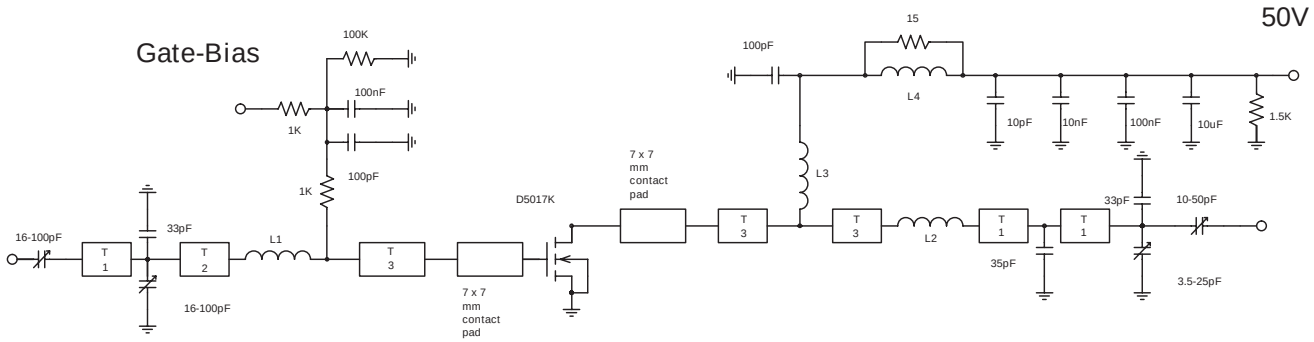


## D5017UK 175MHz Test Fixture

**Substrate 1.6mm PTFE/glass, Er = 2.5**

**All microstrip lines W= 5mm**

**T1 7.5mm**

**T2 12.5 mm**

**T3 6mm**

**L1 Hairpin loop 18 swg 10mm high, 6.5mm gap**

**L2 Hairpin loop 5mm wide ribbon, 7mm high, 3.5 mm gap**

**L3 9 turns 19swg enamelled copper wire, 6mm id.**

**L4 12 turns 19swg enamelled copper wire on Fair-Rite FT82 ferrite core**



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