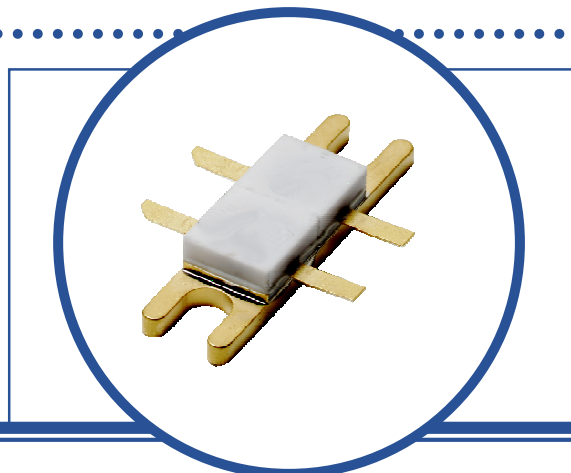


**D1008UK**  
GOLD METALLISED  
MULTI-PURPOSE SILICON  
DMOS RF FET  
80W—28V—500MHZ  
PUSH-PULL



FEATURES:

- SIMPLIFIED AMPLIFIER DESIGN
- SUITABLE FOR BROAD BAND APPLICATIONS
- LOW  $C_{RSS}$
- SIMPLE BIAS CIRCUIT
- LOW NOISE
- HIGH GAIN — 13dB MINIMUM

APPLICATIONS

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

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

|              |                                        |                  |
|--------------|----------------------------------------|------------------|
| $P_D$        | Power Dissipation                      | 175W             |
| $BV_{DSS}$   | Drain – Source Breakdown Voltage       | 70V              |
| $BV_{GSS}$   | Gate – Source Breakdown Voltage        | $\pm 20\text{V}$ |
| $I_{D(SAT)}$ | Drain Current (Per Side)               | 10A              |
| $T_{stg}$    | Storage Temperature Range              | -65 to +150°C    |
| $T_J$        | Maximum Operating Junction Temperature | 200°C            |

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Document Number 7281

Issue 2

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**ELECTRICAL CHARACTERISTICS** ( $T_{CASE} = 25^{\circ}C$  unless otherwise stated)

| Symbols      | Parameters                       | Test Conditions                | Min. | Typ. | Max. | Units   |
|--------------|----------------------------------|--------------------------------|------|------|------|---------|
| PER SIDE     |                                  |                                |      |      |      |         |
| $BV_{DSS}$   | Drain – Source Breakdown Voltage | $V_{GS} = 0V$ $I_D = 100mA$    | 70   |      |      | V       |
| $I_{DSS}$    | Zero Gate Voltage Drain Current  | $V_{DS} = 28V$ $V_{GS} = 0V$   |      |      | 2    | mA      |
| $I_{GSS}$    | Gate Leakage Current             | $V_{GS} = 20V$ $V_{DS} = 0V$   |      |      | 1    | $\mu A$ |
| $V_{GS(th)}$ | Gate Threshold Voltage *         | $I_D = 10mA$ $V_{DS} = V_{GS}$ | 1    |      | 7    | V       |
| $g_{fs}$     | Forward Transconductance*        | $V_{DS} = 10V$ $I_D = 2A$      | 1.6  |      |      | S       |

\* Pulse Width  $\leq 380\mu s$ ,  $\delta \leq 2\%$ **DYNAMIC CHARACTERISTICS**

| Symbols          | Parameters                   | Test Conditions                              | Min.                  | Typ. | Max. | Units |
|------------------|------------------------------|----------------------------------------------|-----------------------|------|------|-------|
| Per Side         |                              |                                              |                       |      |      |       |
| C <sub>iss</sub> | Input Capacitance            | V <sub>DS</sub> = 28V<br>f = 1.0MHz          | V <sub>GS</sub> = -5V |      | 120  | pF    |
| C <sub>oss</sub> | Output Capacitance           | V <sub>DS</sub> = 28V<br>f = 1.0MHz          | V <sub>GS</sub> = 0V  |      | 60   |       |
| C <sub>rss</sub> | Reverse Transfer Capacitance | V <sub>DS</sub> = 28V<br>f = 1.0MHz          | V <sub>GS</sub> = 0V  |      | 5    |       |
| Total Device     |                              |                                              |                       |      |      |       |
| G <sub>ps</sub>  | Common Source Power Gain     | P <sub>o</sub> = 80W<br>V <sub>DS</sub> = 28 |                       | 13   |      | dB    |
| η                | Drain Efficiency             | I <sub>DQ</sub> = 0.4A                       |                       | 50   |      | %     |
| VSWR             | Load Mismatch Tolerance      | f = 400MHz                                   |                       | 20:1 |      |       |

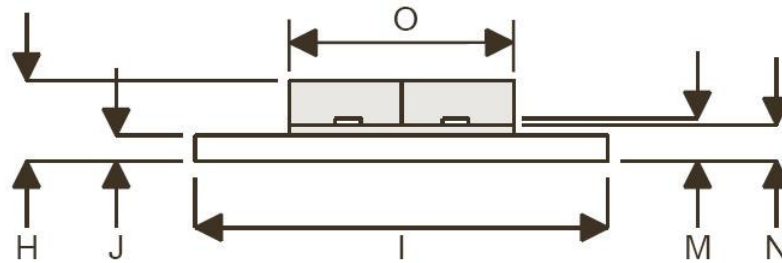
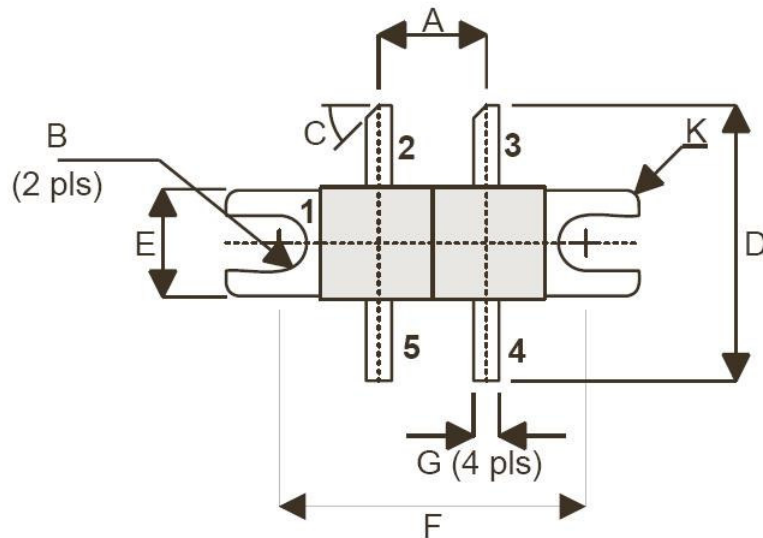
**HAZARDOUS MATERIAL WARNING**

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 Properties**

| Symbols        | Parameters                           | Max. | Units         |
|----------------|--------------------------------------|------|---------------|
| $R_{THj-case}$ | Thermal Resistance, Junction To Case | 1.0  | $^{\circ}C/W$ |

**MECHANICAL DATA**

| DIM | mm    | Tol. | Inches | Tol.  |
|-----|-------|------|--------|-------|
| A   | 6.45  | 0.13 | 0.254  | 0.005 |
| B   | 1.65R | 0.13 | 0.065R | 0.005 |
| C   | 45°   | 5°   | 45°    | 5°    |
| D   | 16.51 | 0.76 | 0.650  | 0.03  |
| E   | 6.47  | 0.13 | 0.255  | 0.005 |
| F   | 18.41 | 0.13 | 0.725  | 0.005 |
| G   | 1.52  | 0.13 | 0.060  | 0.005 |
| H   | 4.82  | 0.25 | 0.190  | 0.010 |
| I   | 24.76 | 0.13 | 0.975  | 0.005 |
| J   | 1.52  | 0.13 | 0.060  | 0.005 |
| K   | 0.81R | 0.13 | 0.032R | 0.005 |
| M   | 0.13  | 0.02 | 0.005  | 0.001 |
| N   | 2.16  | 0.13 | 0.085  | 0.005 |

**DK METAL PACKAGE**

Pin 1 – Source (Common)

Pin 2 – Drain1

Pin 3 – Drain2

Pin 4 – Gate 2

Pin 5 – Gate 1

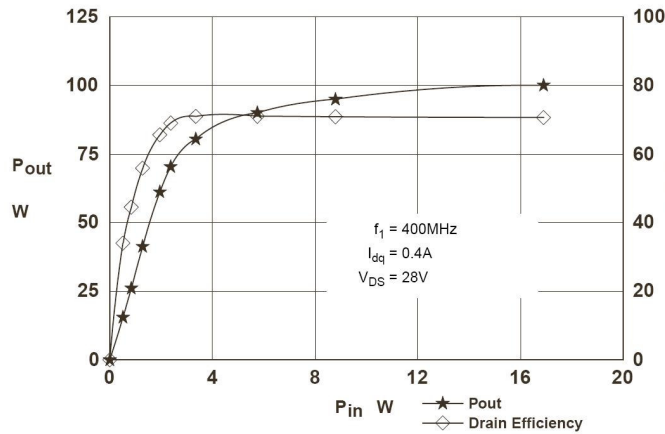


Figure 01— Power Output and Efficiency vs. Power Input.

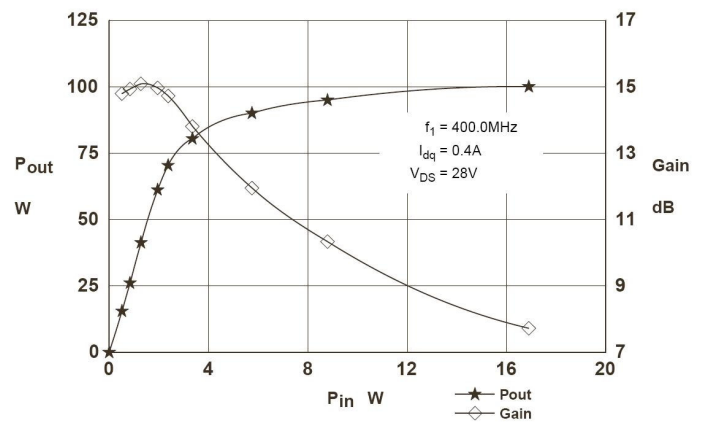


Figure 02— Power Output and Gain vs. Power Input.

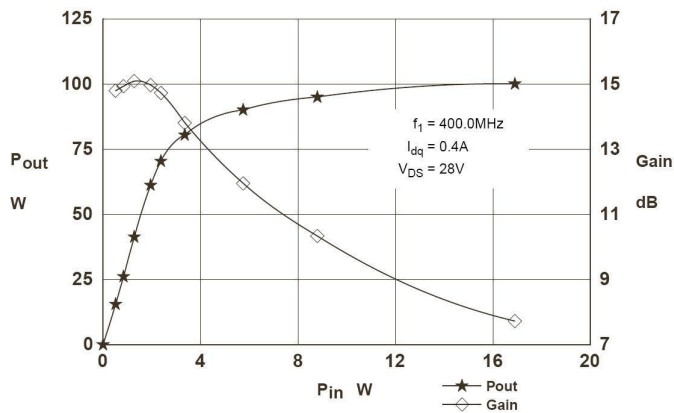


Figure 03— IMD vs. Output Power.

### D1008UK OPTIMUM SOURCE AND LOAD IMPEDANCE

| FREQUENCY<br>MHZ | $Z_S$<br>$\Omega$ | $Z_L$<br>$\Omega$ |
|------------------|-------------------|-------------------|
| 400              | $1.5 + j0.2$      | $5.0 + j2.0$      |

### Typical S Parameters

Vds = 28V, Id=1A

MHz S M A R 50

| !Freq<br>MHz | S11<br>mag ang | S21<br>mag ang | S12<br>mag ang | S22<br>mag ang |
|--------------|----------------|----------------|----------------|----------------|
| 100          | 0.794 -158     | 14.622 69      | 0.0115 -7      | 0.61 -145      |
| 200          | 0.881 -167     | 5.821 42       | 0.0061 3       | 0.794 -156     |
| 300          | 0.923 -171     | 3.02 28        | 0.0068 60      | 0.871 -162     |
| 400          | 0.923 -176     | 1.82 18        | 0.117 77       | 0.902 -167     |
| 500          | 0.937 -179     | 1.439 15       | 0.0168 76      | 0.923 -169     |
| 600          | 0.952 177      | 1.057 13       | 0.0234 75      | 0.945 -171     |
| 700          | 0.966 174      | 0.676 10       | 0.0285 74      | 0.966 -174     |
| 800          | 0.966 171      | 0.543 5        | 0.0335 69      | 0.955 -177     |
| 900          | 0.977 167      | 0.447 1        | 0.0394 64      | 0.966 178      |
| 1000         | 0.966 165      | 0.359 1        | 0.0432 64      | 0.955 178      |

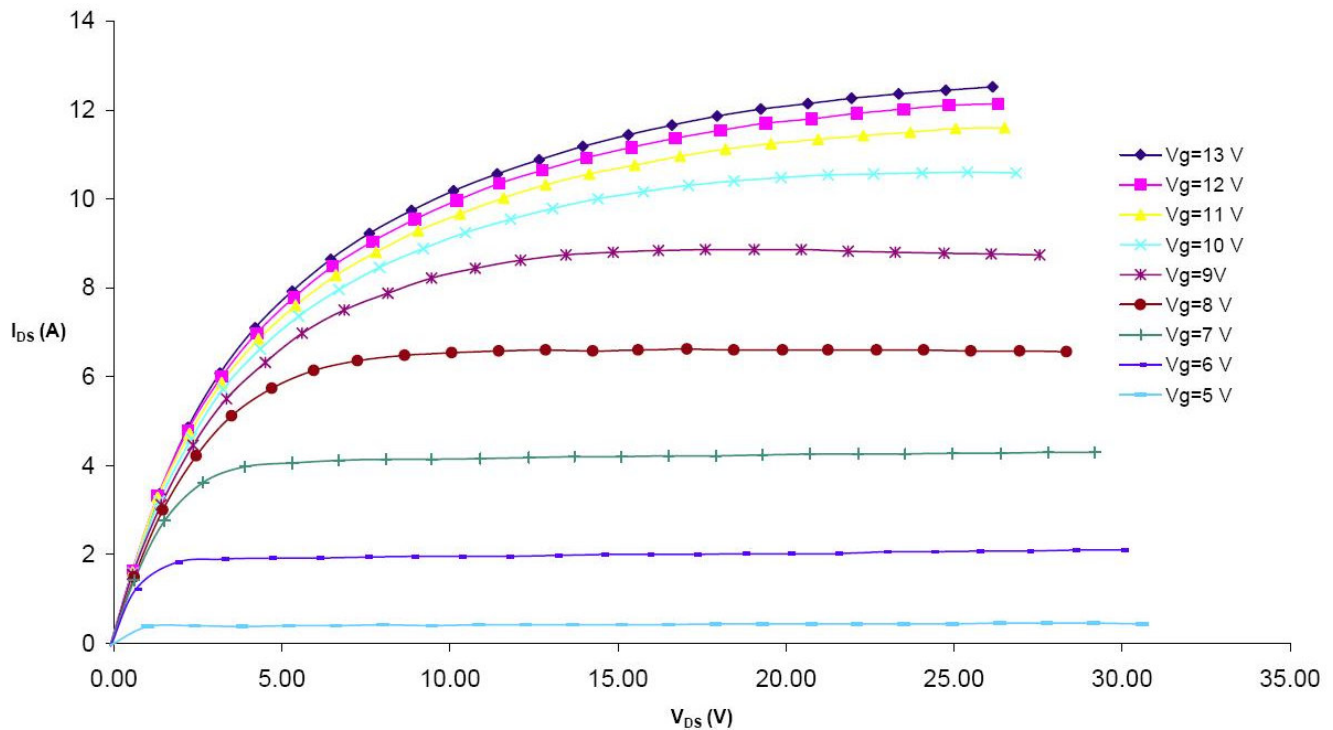


Figure 4—Typical IV Characteristics

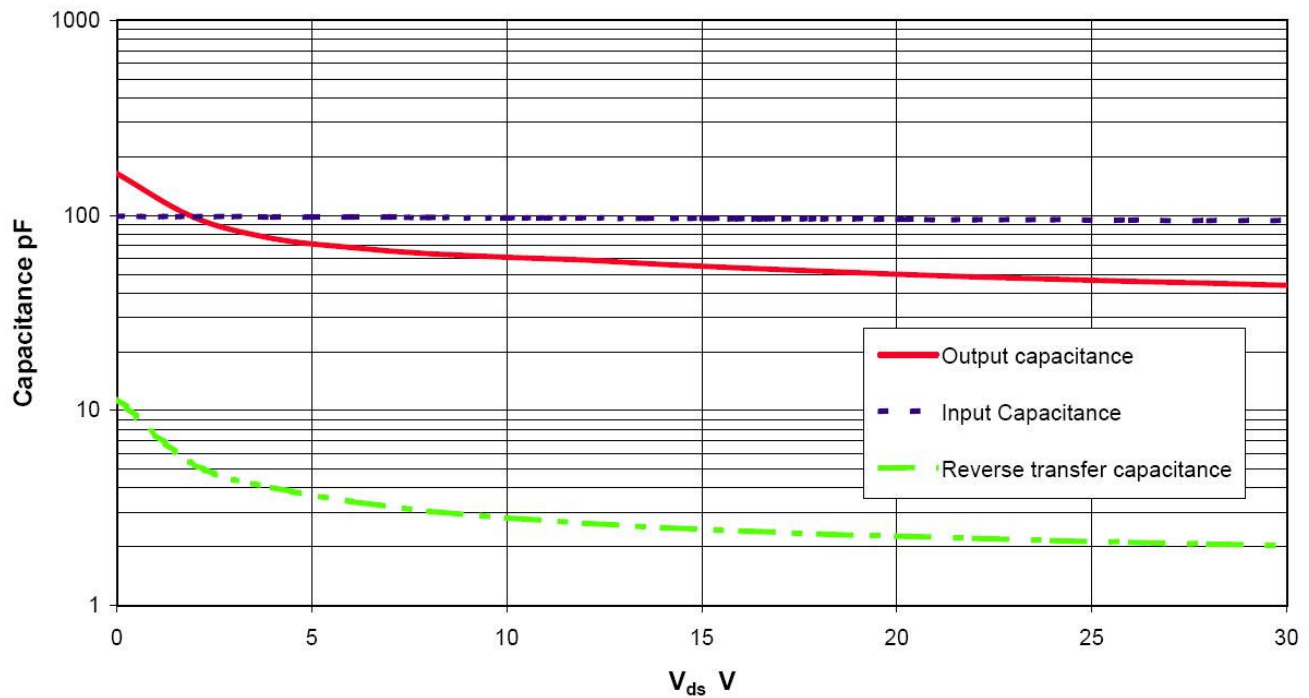
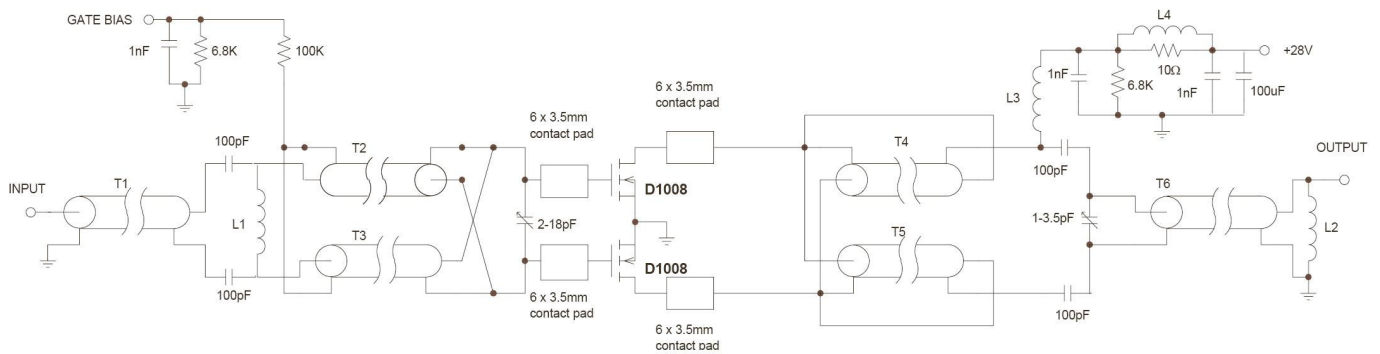


Figure 5—Typical CV Characteristics



## D1008UK TEST FIXTURE

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

|        |                                  |    |                                                |
|--------|----------------------------------|----|------------------------------------------------|
| T1     | 70mm 50 UT34 SEMI RIGID COAX     | L1 | 3.5 turns of 24swg ECW, 3mm ID                 |
| T2, T3 | 85mm 25 UT70-25 SEMI RIGID COAX  | L2 | 5.5 turns of 24swg ECW, 4mm ID                 |
| T4, T5 | 100mm 15 UT85-15 SEMI RIGID COAX | L3 | 4 turns of 21swg ECW, 7mm ID                   |
| T6     | 70mm 50 UT85 SEMI RIGID COAX     | L4 | 3 turns of 21swg ECW on Fair-Rite FT50-75 core |

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