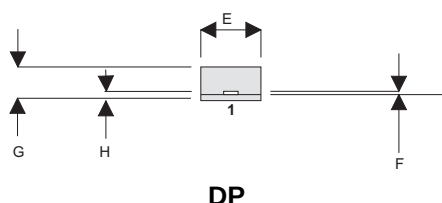
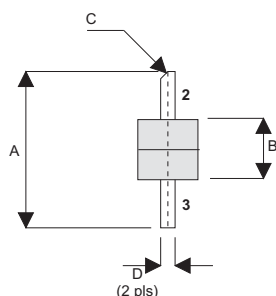


## MECHANICAL DATA

# GOLD METALLISED MULTI-PURPOSE SILICON DMOS RF FET 10W – 12.5V – 1GHz SINGLE ENDED



PIN 1 SOURCE PIN 2 DRAIN  
PIN 3 GATE

| DIM | mm    | Tol. | Inches | Tol.  |
|-----|-------|------|--------|-------|
| A   | 16.51 | 0.25 | 0.650  | 0.010 |
| B   | 6.35  | 0.13 | 0.250  | 0.005 |
| C   | 45°   | 5°   | 45°    | 5°    |
| D   | 1.52  | 0.13 | 0.060  | 0.005 |
| E   | 6.35  | 0.13 | 0.250  | 0.005 |
| F   | 0.13  | 0.03 | 0.005  | 0.001 |
| G   | 3.56  | 0.51 | 0.140  | 0.020 |
| H   | 0.64  | 0.13 | 0.024  | 0.005 |

## FEATURES

- SIMPLIFIED AMPLIFIER DESIGN
- SUITABLE FOR BROAD BAND APPLICATIONS
- LOW  $C_{rss}$
- SIMPLE BIAS CIRCUITS
- LOW NOISE
- HIGH GAIN – 10 dB MINIMUM

## APPLICATIONS

- VHF/UHF COMMUNICATIONS  
from DC to 1 GHz

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

|              |                                        |                         |
|--------------|----------------------------------------|-------------------------|
| $P_D$        | Power Dissipation                      | 42W                     |
| $BV_{DSS}$   | Drain – Source Breakdown Voltage       | 40V                     |
| $BV_{GSS}$   | Gate – Source Breakdown Voltage        | $\pm 20V$               |
| $I_{D(sat)}$ | Drain Current                          | 8A                      |
| $T_{stg}$    | Storage Temperature                    | $-65$ to $150^{\circ}C$ |
| $T_j$        | Maximum Operating Junction Temperature | $200^{\circ}C$          |

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## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25°C unless otherwise stated)

| Parameter                                        | Test Conditions                                         | Min. | Typ. | Max. | Unit |
|--------------------------------------------------|---------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub> Drain–Source Breakdown Voltage | V <sub>GS</sub> = 0 I <sub>D</sub> = 10mA               | 40   |      |      | V    |
| I <sub>DSS</sub> Zero Gate Voltage Drain Current | V <sub>DS</sub> = 12.5V V <sub>GS</sub> = 0             |      |      | 1    | mA   |
| I <sub>GSS</sub> Gate Leakage Current            | V <sub>GS</sub> = 20V V <sub>DS</sub> = 0               |      |      | 1    | μA   |
| V <sub>GS(th)</sub> Gate Threshold Voltage*      | I <sub>D</sub> = 10mA V <sub>DS</sub> = V <sub>GS</sub> | 0.5  |      | 7    | V    |
| g <sub>fs</sub> Forward Transconductance*        | V <sub>DS</sub> = 10V I <sub>D</sub> = 0.8A             | 0.72 |      |      | S    |
| G <sub>PS</sub> Common Source Power Gain         | P <sub>O</sub> = 10W                                    | 10   |      |      | dB   |
| η Drain Efficiency                               | V <sub>DS</sub> = 12.5V I <sub>DQ</sub> = 0.4A          | 40   |      |      | %    |
| VSWR Load Mismatch Tolerance                     | f = 1GHz                                                | 20:1 |      |      | —    |
| C <sub>iss</sub> Input Capacitance               | V <sub>DS</sub> = 0 V <sub>GS</sub> = –5V f = 1MHz      |      |      | 48   | pF   |
| C <sub>oss</sub> Output Capacitance              | V <sub>DS</sub> = 12.5V V <sub>GS</sub> = 0 f = 1MHz    |      |      | 40   | pF   |
| C <sub>rss</sub> Reverse Transfer Capacitance    | V <sub>DS</sub> = 12.5V V <sub>GS</sub> = 0 f = 1MHz    |      |      | 4    | 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 <sub>THj-case</sub> | Thermal Resistance Junction – Case | Max. 4.2°C / W |
|-----------------------|------------------------------------|----------------|

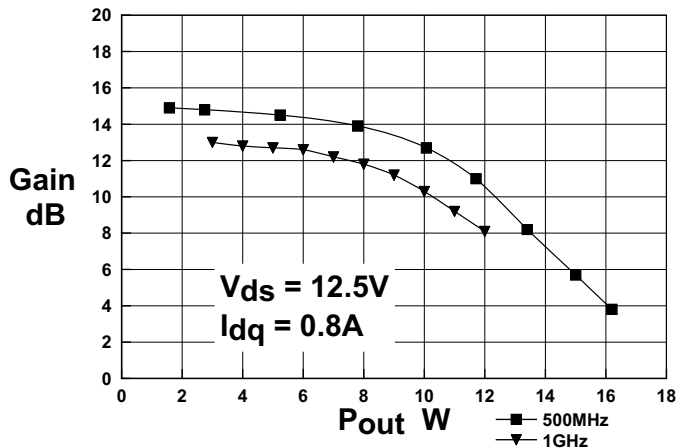


Figure 1- Gain vs. Power Output

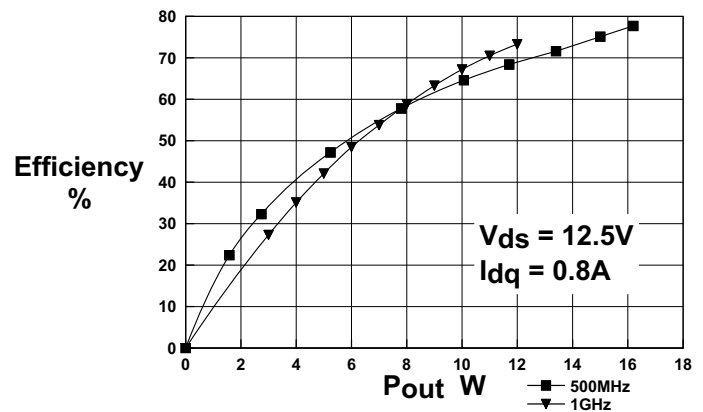


Figure 2 - Efficiency vs Output Power

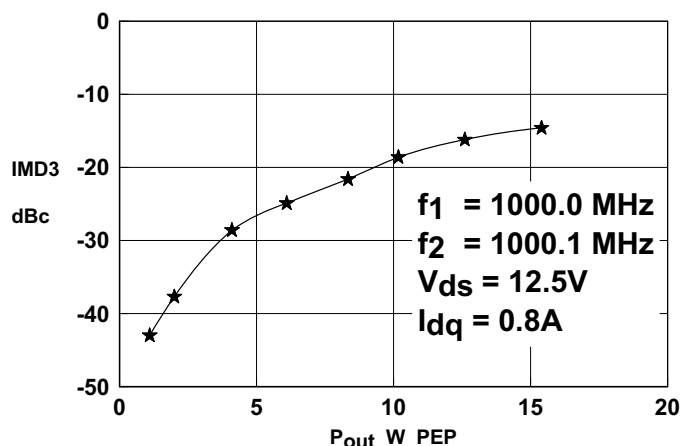


Figure 3 - IMD vs Power Output

## D2214UK OPTIMUM SOURCE AND LOAD IMPEDANCE

| Frequency<br>MHz | $Z_S$<br>$\Omega$ | $Z_L$<br>$\Omega$ |
|------------------|-------------------|-------------------|
| 1000MHz          | $0.9 - j4.9$      | $1.9 - j7.3$      |

## Typical S Parameters

!  $V_{DS} = 12.5V$ ,  $I_{DQ} = 0.8A$

# MHz S MA R 50

| !Freq<br>!MHz | S11<br>mag | ang    | S21<br>mag | ang   | S12<br>mag | ang   | S22<br>mag | ang    |
|---------------|------------|--------|------------|-------|------------|-------|------------|--------|
| 70            | 0.77       | -124.6 | 19.6       | 100.6 | 0.020      | 10.0  | 0.58       | -120.3 |
| 100           | 0.75       | -136.7 | 14.7       | 89.0  | 0.020      | 2.0   | 0.60       | -130.3 |
| 150           | 0.77       | -148   | 9.3        | 72.2  | 0.017      | -7.6  | 0.65       | -140.3 |
| 200           | 0.80       | -154.9 | 6.4        | 61.7  | 0.015      | -10.3 | 0.71       | -146.8 |
| 250           | 0.83       | -160.2 | 4.7        | 52.8  | 0.012      | -10.4 | 0.76       | -151.4 |
| 300           | 0.85       | -164.1 | 3.8        | 49.3  | 0.010      | -4.1  | 0.79       | -155.5 |
| 350           | 0.87       | -167.8 | 3.0        | 39.7  | 0.007      | 8.7   | 0.82       | -159.6 |
| 400           | 0.88       | -170.9 | 2.5        | 39.0  | 0.006      | 29.4  | 0.85       | -162.6 |
| 450           | 0.90       | -174.5 | 2.0        | 33.8  | 0.007      | 56.1  | 0.87       | -165.9 |
| 500           | 0.90       | -177.5 | 1.8        | 31.5  | 0.009      | 73.1  | 0.87       | -168.5 |
| 550           | 0.92       | -179.2 | 1.5        | 25.5  | 0.012      | 80.5  | 0.90       | -171.7 |
| 600           | 0.92       | -176.5 | 1.4        | 20.4  | 0.016      | 81.4  | 0.90       | -174.4 |
| 650           | 0.93       | -174.6 | 1.2        | 17.5  | 0.018      | 84.5  | 0.91       | -176.5 |
| 700           | 0.94       | -172.2 | 1.1        | 11.7  | 0.021      | 81.5  | 0.92       | -178.7 |
| 750           | 0.94       | -169.7 | 0.9        | 10.0  | 0.022      | 83.0  | 0.93       | -179.1 |
| 800           | 0.95       | -167.6 | 0.7        | 7.7   | 0.024      | 82.7  | 0.94       | -177.2 |
| 850           | 0.95       | -165.5 | 0.6        | 11.4  | 0.027      | 88.1  | 0.94       | -174.4 |
| 900           | 0.96       | -164.1 | 0.6        | 11.4  | 0.031      | 89.0  | 0.95       | -172.6 |
| 950           | 0.96       | -161.3 | 0.6        | 12.3  | 0.036      | 89.5  | 0.95       | -170.6 |
| 1000          | 0.96       | -158.6 | 0.5        | 8.7   | 0.040      | 86.0  | 0.95       | -169   |

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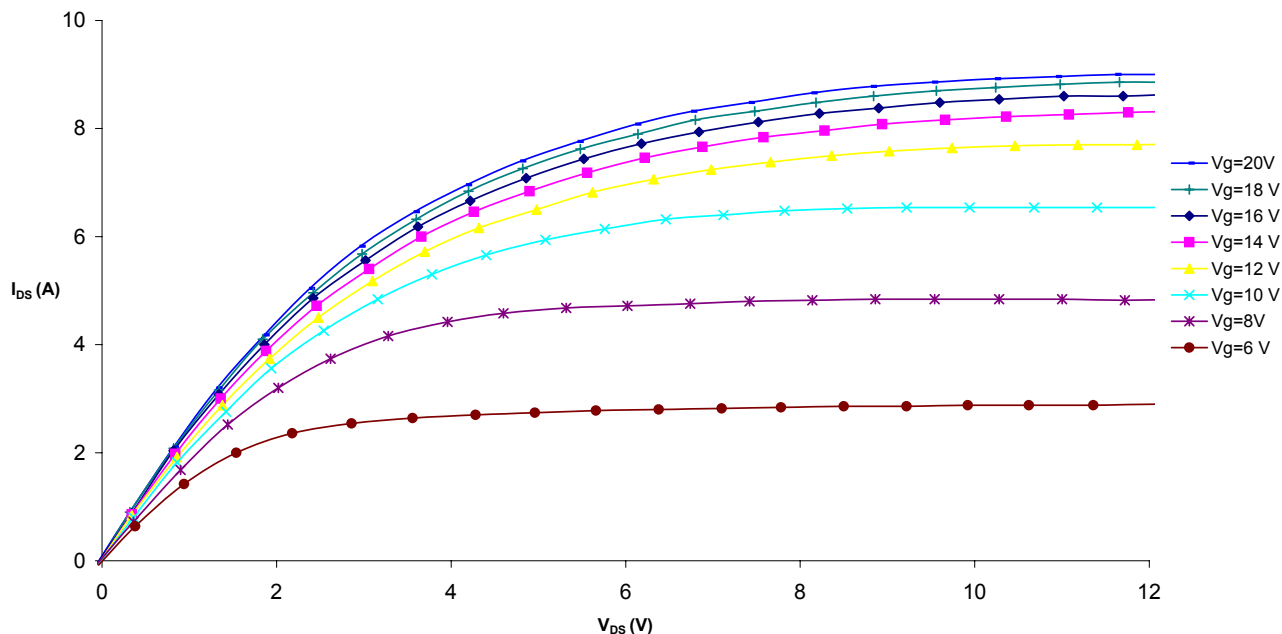


Figure 4 – Typical IV Characteristics.

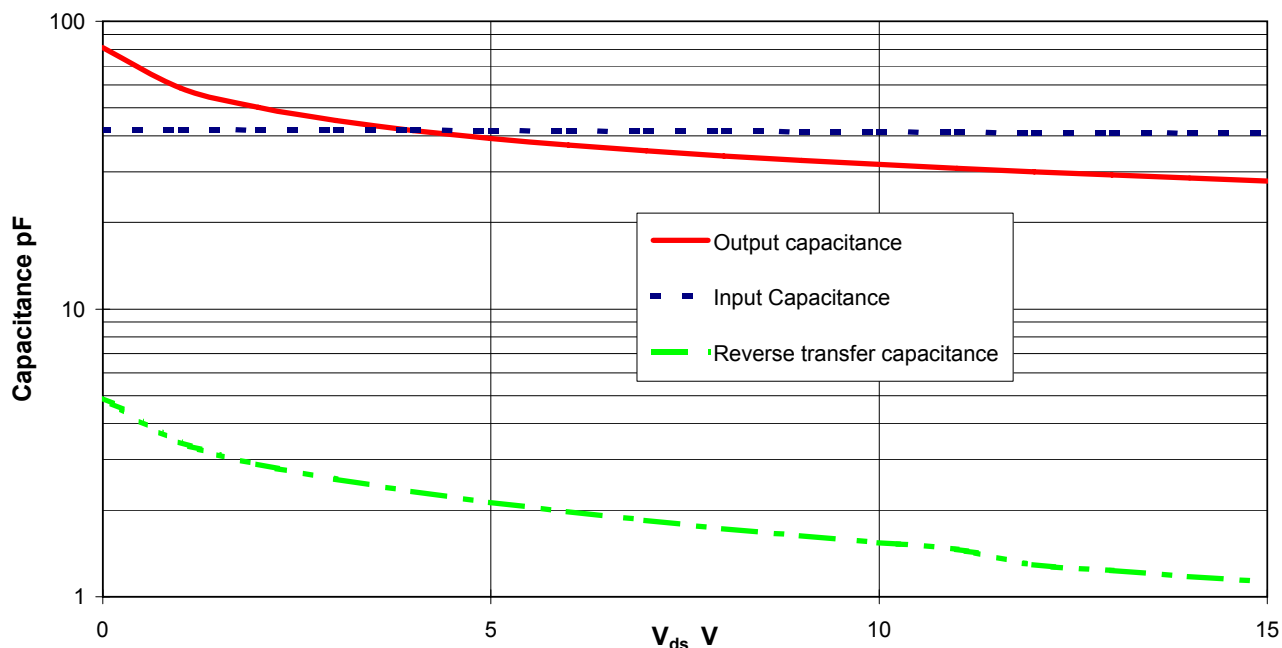
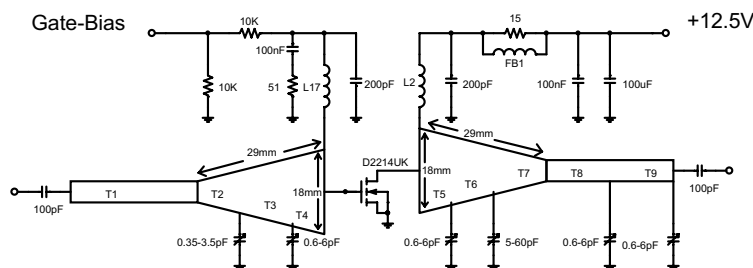


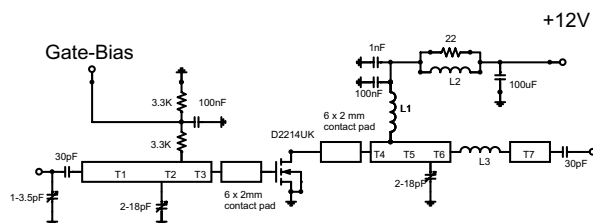
Figure 5 – Typical CV Characteristics.



Substrate 0.8mm PTFE/glass

|                                                      |                 |
|------------------------------------------------------|-----------------|
| T1 28mm 50 Ohms                                      | T6 14mm         |
| T2 11mm                                              | T7 10mm         |
| T3 11mm                                              | T8 11mm 50 Ohms |
| T4 7mm                                               | T9 17mm 50 Ohms |
| T5 5mm                                               |                 |
| FB1 Murata BL02RN1-R62                               |                 |
| L1,L2 10 turns 22swg enamelled copper wire, 6mm i.d. |                 |

## Figure 6 - 1GHz Test Fixture



Substrate 0.8mm PTFE/glass, Er=2.5

All microstrip lines W=2.2mm

|                                                                                  |
|----------------------------------------------------------------------------------|
| T1 32mm                                                                          |
| T2 4mm                                                                           |
| T3 5mm                                                                           |
| T4 3mm                                                                           |
| T5 9mm                                                                           |
| T6 7.5mm                                                                         |
| T7 13mm                                                                          |
| L1 6 turns 0.5mm dia enamelled copper wire, 3mm i.d.                             |
| L2 1.5 turns 0.5mm enamelled copper wire on Siemens B62152A7 2 hole ferrite core |
| L3 1/16" dia wire hairpin loop 15mm long                                         |

## Figure 7 - 500MHz Test Fixture

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