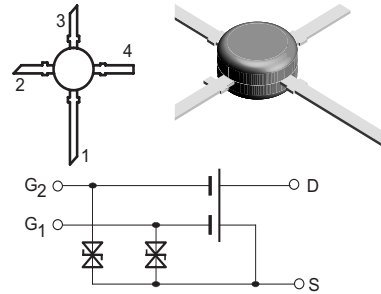


N-Channel Dual Gate MOS-Fieldeffect Tetrode, Depletion Mode

Features

- Integrated gate protection diodes
- High cross modulation performance
- Low noise figure
- High AGC-range
- Low feedback capacitance
- Low input capacitance
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



Electrostatic sensitive device.
Observe precautions for handling.

13625

Applications

Input- and mixer stages especially VHF TV-tuners.

Mechanical Data

Case: TO-50 Plastic case

Weight: approx. 124 mg

Marking: BF964S

Pinning:

1 = Drain, 2 = Source,

3 = Gate 1, 4 = Gate 2

Parts Table

| Part | Ordering Ccode | Marking | Package |
|---------|--------------------|---------|---------|
| BF964S | BF964SA or BF964SB | BF964S | TO50 |
| BF964SA | BF964SA | BF964S | TO50 |
| BF964SB | BF964SB | BF964S | TO50 |

Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

| Parameter | Test condition | Symbol | Value | Unit |
|-------------------------------------|---|-------------------|---------------|--------------------|
| Drain - source voltage | | V_{DS} | 20 | V |
| Drain current | | I_D | 30 | mA |
| Gate 1/Gate 2 - source peak current | | $\pm I_{G1/G2SM}$ | 10 | mA |
| Total power dissipation | $T_{amb} \leq 60\text{ }^{\circ}\text{C}$ | P_{tot} | 200 | mW |
| Channel temperature | | T_{Ch} | 150 | $^{\circ}\text{C}$ |
| Storage temperature range | | T_{stg} | - 55 to + 150 | $^{\circ}\text{C}$ |

Maximum Thermal Resistance

| Parameter | Test condition | Symbol | Value | Unit |
|-----------------|----------------|-------------|-------|------|
| Channel ambient | ¹⁾ | R_{thChA} | 450 | K/W |

¹⁾ on glass fibre printed board (40 x 25 x 1.5) mm³ plated with 35 μm Cu

Electrical DC Characteristics

T_{amb} = 25 °C, unless otherwise specified

| Parameter | Test condition | Part | Symbol | Min | Typ. | Max | Unit |
|-----------------------------------|--|---------|-------------------------|-----|------|------|------|
| Drain - source breakdown voltage | I _D = 10 μA, -V _{G1S} = -V _{G2S} = 4 V | | V _{(BR)DS} | 20 | | | V |
| Gate 1 - source breakdown voltage | ± I _{G1S} = 10 mA, V _{G2S} = V _{DS} = 0 | | ± V _{(BR)G1SS} | 8 | | 14 | V |
| Gate 2 - source breakdown voltage | ± I _{G2S} = 10 mA, V _{G1S} = V _{DS} = 0 | | ± V _{(BR)G2SS} | 8 | | 14 | V |
| Gate 1 - source leakage current | ± V _{G1S} = 5 V, V _{G2S} = V _{DS} = 0 | | ± I _{G1SS} | | | 50 | nA |
| Gate 2 - source leakage current | ± V _{G2S} = 5 V, V _{G1S} = V _{DS} = 0 | | ± I _{G2SS} | | | 50 | nA |
| Drain current | V _{DS} = 15 V, V _{G1S} = 0, V _{G2S} = 4 V | BF964S | I _{DSS} | 4 | | 18 | mA |
| | | BF964SA | I _{DSS} | 4 | | 10.5 | mA |
| | | BF964SB | I _{DSS} | 9.5 | | 18 | mA |
| Gate 1 - source cut-off voltage | V _{DS} = 15 V, V _{G2S} = 4 V, I _D = 20 μA | | -V _{G1S(OFF)} | | | 2.5 | V |
| Gate 2 - source cut-off voltage | V _{DS} = 15 V, V _{G1S} = 0, I _D = 20 μA | | -V _{G2S(OFF)} | | | 2.0 | V |

Electrical AC Characteristics

T_{amb} = 25 °C, unless otherwise specified

V_{DS} = 15 V, I_D = 10 mA, V_{G2S} = 4 V, f = 1 MHz

| Parameter | Test condition | Symbol | Min | Typ. | Max | Unit |
|--------------------------|---|--------------------|-----|------|-----|------|
| Forward transadmittance | | Y _{21s} | 15 | 18.5 | | mS |
| Gate 1 input capacitance | | C _{issg1} | | 2.5 | 3.0 | pF |
| Gate 2 input capacitance | V _{G1S} = 0, V _{G2S} = 4 V | C _{issg2} | | 1.2 | | pF |
| Feedback capacitance | | C _{rss} | | 25 | 35 | fF |
| Output capacitance | | C _{oss} | | 1.0 | 1.3 | pF |
| Power gain | G _S = 2 mS, G _L = 0.5 mS, f = 200 MHz | G _{ps} | | 25 | | dB |
| AGC range | V _{G2S} = 4 to -2 V, f = 200 MHz | ΔG _{ps} | 50 | | | dB |
| Noise figure | G _S = 2 mS, G _L = 0.5 mS, f = 200 MHz | F | | 1.0 | | dB |

Typical Characteristics (T_{amb} = 25 °C unless otherwise specified)

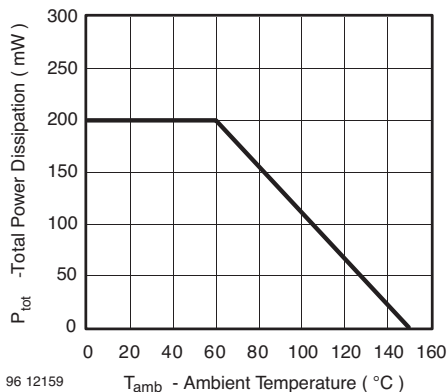


Figure 1. Total Power Dissipation vs. Ambient Temperature

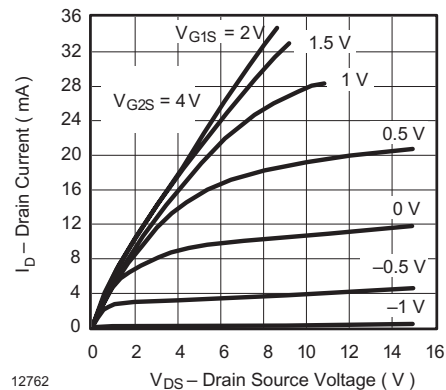


Figure 2. Drain Current vs. Drain Source Voltage

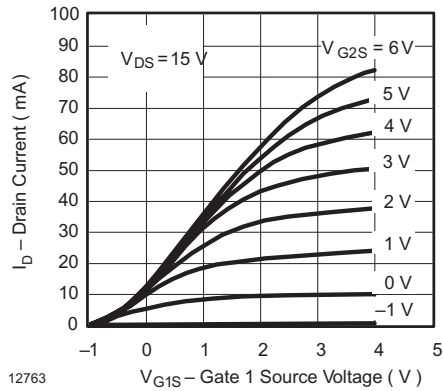


Figure 3. Drain Current vs. Gate 1 Source Voltage

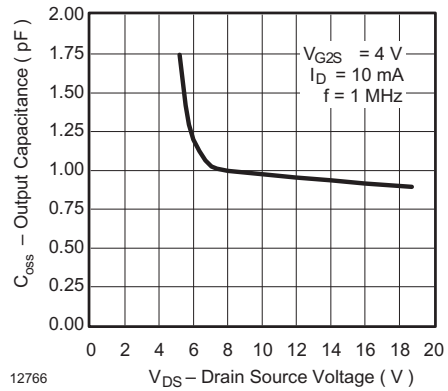


Figure 6. Output Capacitance vs. Drain Source Voltage

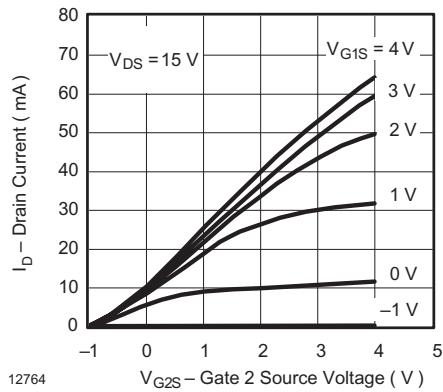


Figure 4. Drain Current vs. Gate 2 Source Voltage

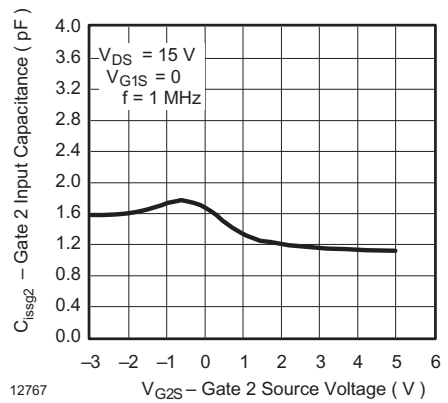


Figure 7. Gate 2 Input Capacitance vs. Gate 2 Source Voltage

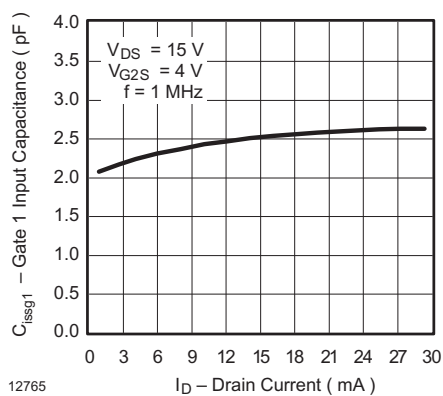


Figure 5. Gate 1 Input Capacitance vs. Drain Current

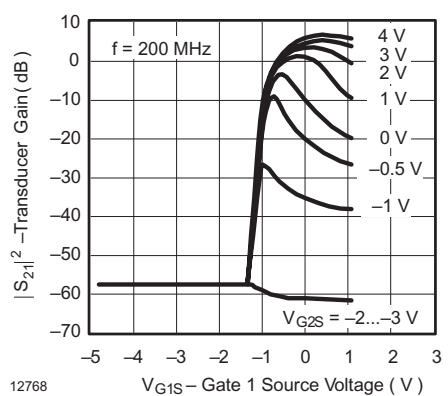


Figure 8. Transducer Gain vs. Gate 1 Source Voltage

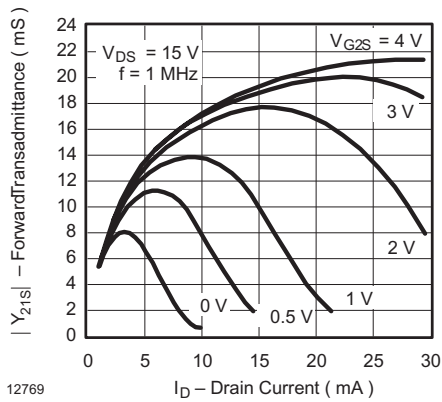


Figure 9. Forward Transadmittance vs. Drain Current

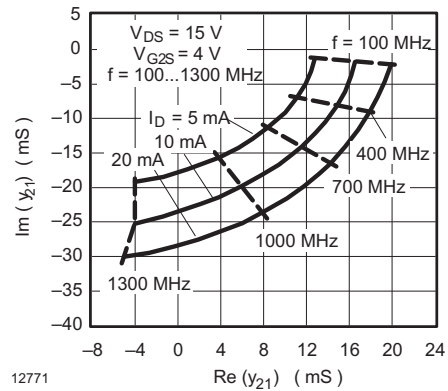


Figure 12. Short Circuit Forward Transfer Admittance

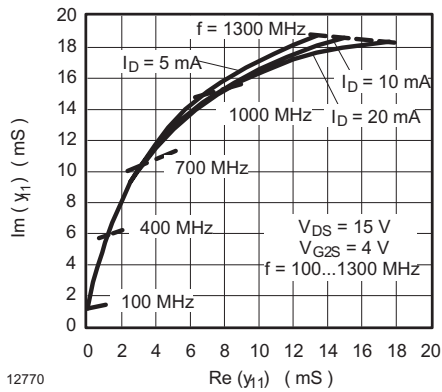


Figure 10. Short Circuit Input Admittance

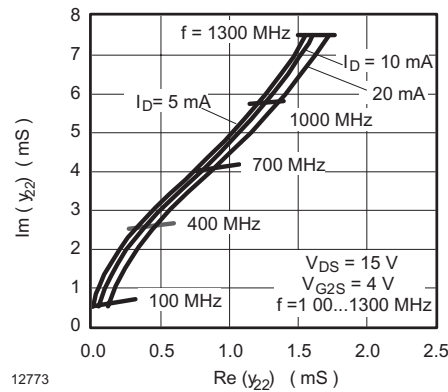


Figure 13. Short Circuit Output Admittance

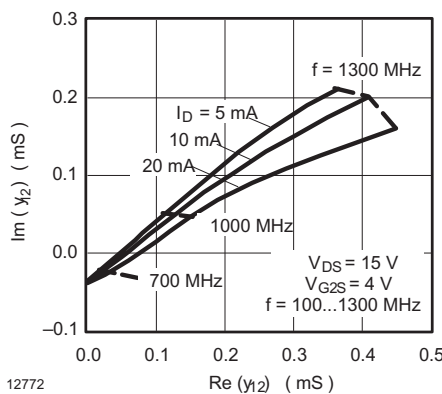


Figure 11. Short Circuit Reverse Transfer Admittance

$V_{DS} = 15\text{ V}$, $I_D = 5\text{ to }20\text{ mA}$, $V_{G2S} = 4\text{ V}$, $Z_0 = 50\ \Omega$

S_{11}

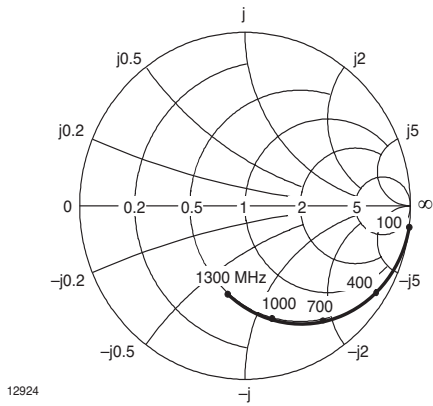


Figure 14. Input Reflection Coefficient

S_{12}

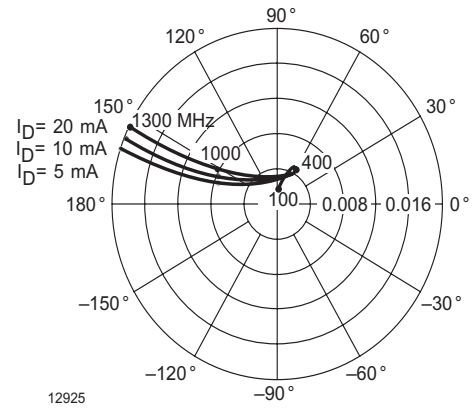


Figure 16. Reverse Transmission Coefficient

S_{21}

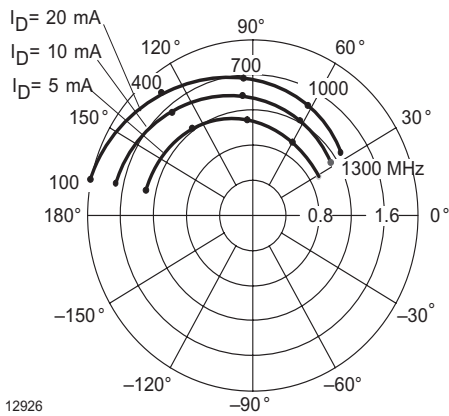


Figure 15. Forward Transmission Coefficient

S_{22}

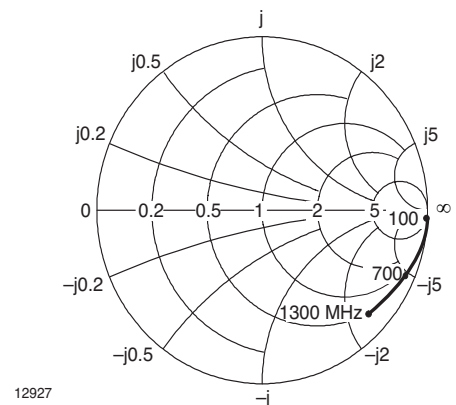
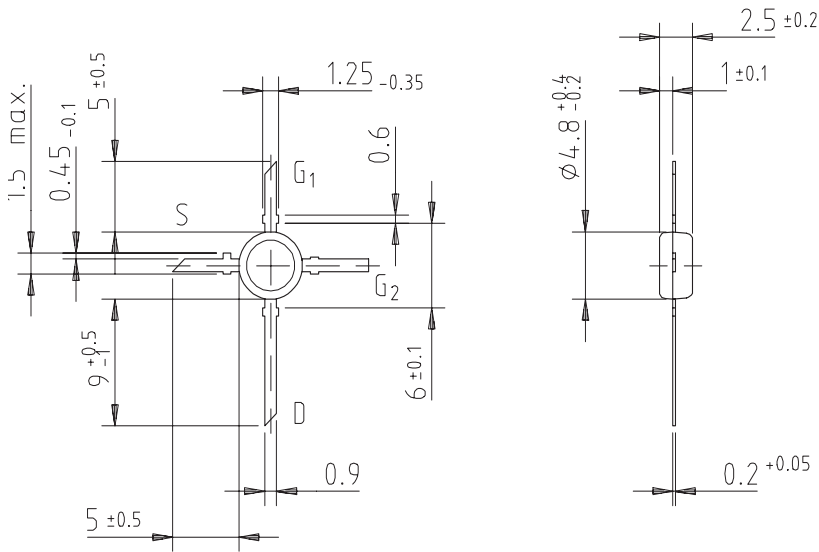
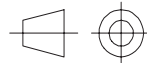


Figure 17. Output Reflection Coefficient

Package Dimensions in mm



96 12242



technical drawings
according to DIN
specifications



Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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