# SD4931

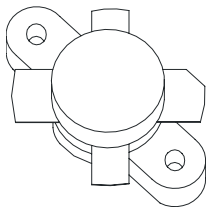
## RF power transistors
## HF/VHF/UHF N-channel MOSFETs

## Features

- Improved ruggedness $V_{(BR)DSS}$ > 200 V
- Excellent thermal stability
- 20:1 all phases load mismatch capability
- $P_{OUT}$ = 150 W min.
  with 14.8 dB gain @ 175 MHz
- In compliance with the 2002/95/EC European directive

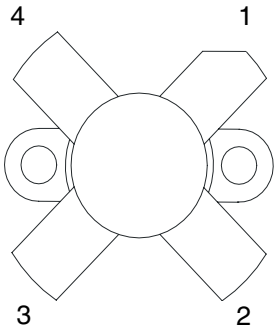
## Description

The SD4931 is a N-channel MOS field-effect RF power transistor. It is intended for use in 50 V DC large signal applications up to 250 MHz.



**M174**
**Epoxy sealed**

**Figure 1. Pin connection**




1. Drain
2. Source
3. Gate
4. Source

**Table 1. Device summary**

| Order code | Marking | Base qty. | Package | Packaging[1] |
|---|---|---|---|---|
| SD4931 | SD4931[1] | 25 pcs | M174 | Plastic tray |

1. For more details please refer to *Chapter 5: Marking, packing and shipping specifications.*.

# Contents

# 1 Electrical data

## 1.1 Maximum ratings

**Table 2. Absolute maximum ratings ($T_{CASE}$ = 25°C)**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{(BR)DSS}$ | Drain source voltage | 200 | V |
| $V_{DGR}$ | Drain-gate voltage ($R_{GS}$ = 1 MΩ) | 200 | V |
| $V_{GS}$ | Gate-source voltage | ±20 | V |
| $I_D$ | Drain current | 20 | A |
| $P_{DISS}$ | Power dissipation | 389 | W |
| $T_J$ | Max. operating junction temperature | 200 | °C |
| $T_{STG}$ | Storage temperature | -65 to +150 | °C |

## 1.2 Thermal data

**Table 3. Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thJC}$ | Junction - case thermal resistance | 0.45 | °C/W |

# 2 Electrical characteristics

$T_{CASE}$ = +25 °C

## 2.1 Static

**Table 4. Static**

| Symbol | Test conditions | | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | $V_{GS}$ = 0 V | $I_{DS}$ = 100 mA | | 200 | | | V |
| $I_{DSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 100 V | | | | 1 | mA |
| $I_{GSS}$ | $V_{GS}$ = 20 V | $V_{DS}$ = 0 V | | | | 250 | nA |
| $V_{TH}$ | $I_D$ = 250 V | | | 1.5 | 2.5 | 4.0 | V |
| $V_{DS(ON)}$ | $V_{GS}$ = 10 V | $I_D$ = 10 A | | | 3.5 | 5.0 | V |
| $G_{FS}$ | $V_{DS}$ = 10 V | $I_D$ = 2.5 A | | 2.5 | 4.0 | | S |
| $C_{ISS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 50 V | f = 1 MHz | | 500 | | pF |
| $C_{OSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 50 V | f = 1 MHz | | 200 | | pF |
| $C_{RSS}$ | $V_{GS}$ = 0 V | $V_{DS}$ = 50 V | f = 1 MHz | | 8 | | pF |

## 2.2 Dynamic

**Table 5. Dynamic**

| Symbol | Test conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| $P_{1dB}$ | $V_{DD}$ = 50 V $I_{DQ}$ = 250 mA f = 175 MHz | 150 | 175 | | W |
| $G_{PS}$ | $V_{DD}$ = 50 V $I_{DQ}$ = 250 mA $P_{OUT}$ = 150 W f = 175 MHz | 13 | 14.8 | | dB |
| $n_D$ | $V_{DD}$ = 50 V $I_{DQ}$ = 250 mA $P_{OUT}$ = 150 W f = 175 MHz | 50 | 56 | | % |
| Load mismatch | $V_{DD}$ = 50 V $I_{DQ}$ = 250 mA $P_{OUT}$ = 150 W f = 175 MHz All phase angles | 10:1 | 20:1 | | VSWR |

# 3 Typical performance

**Figure 2. Transient thermal impedance**

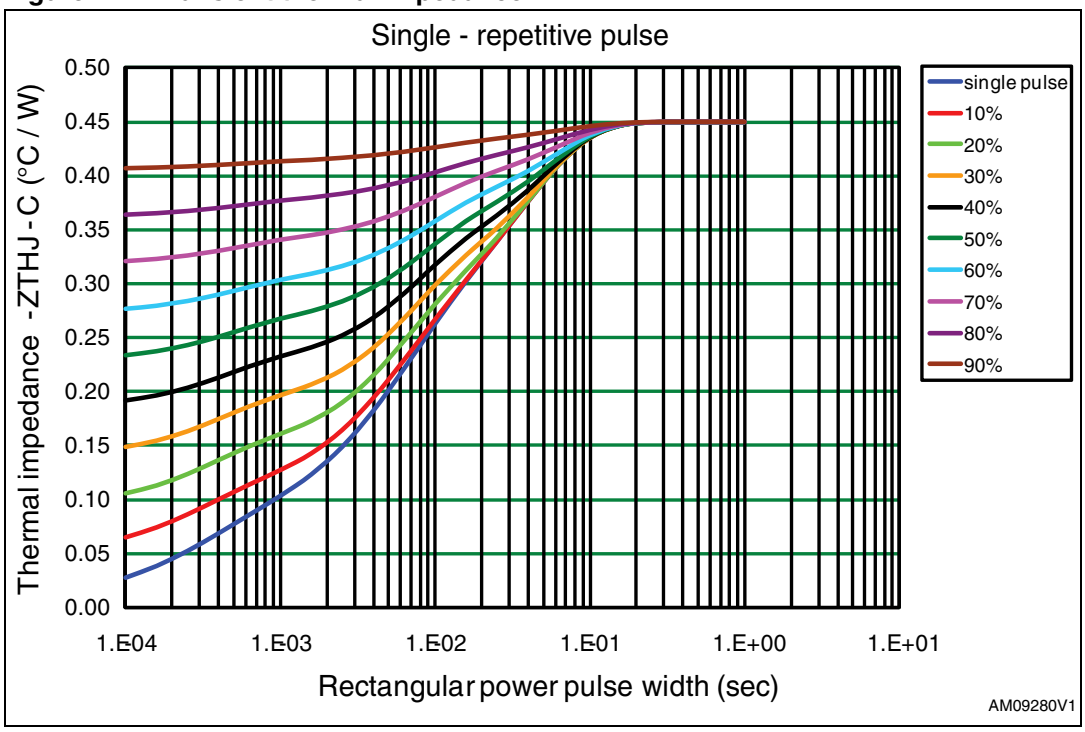


**Figure 3. Transient thermal impedance model**

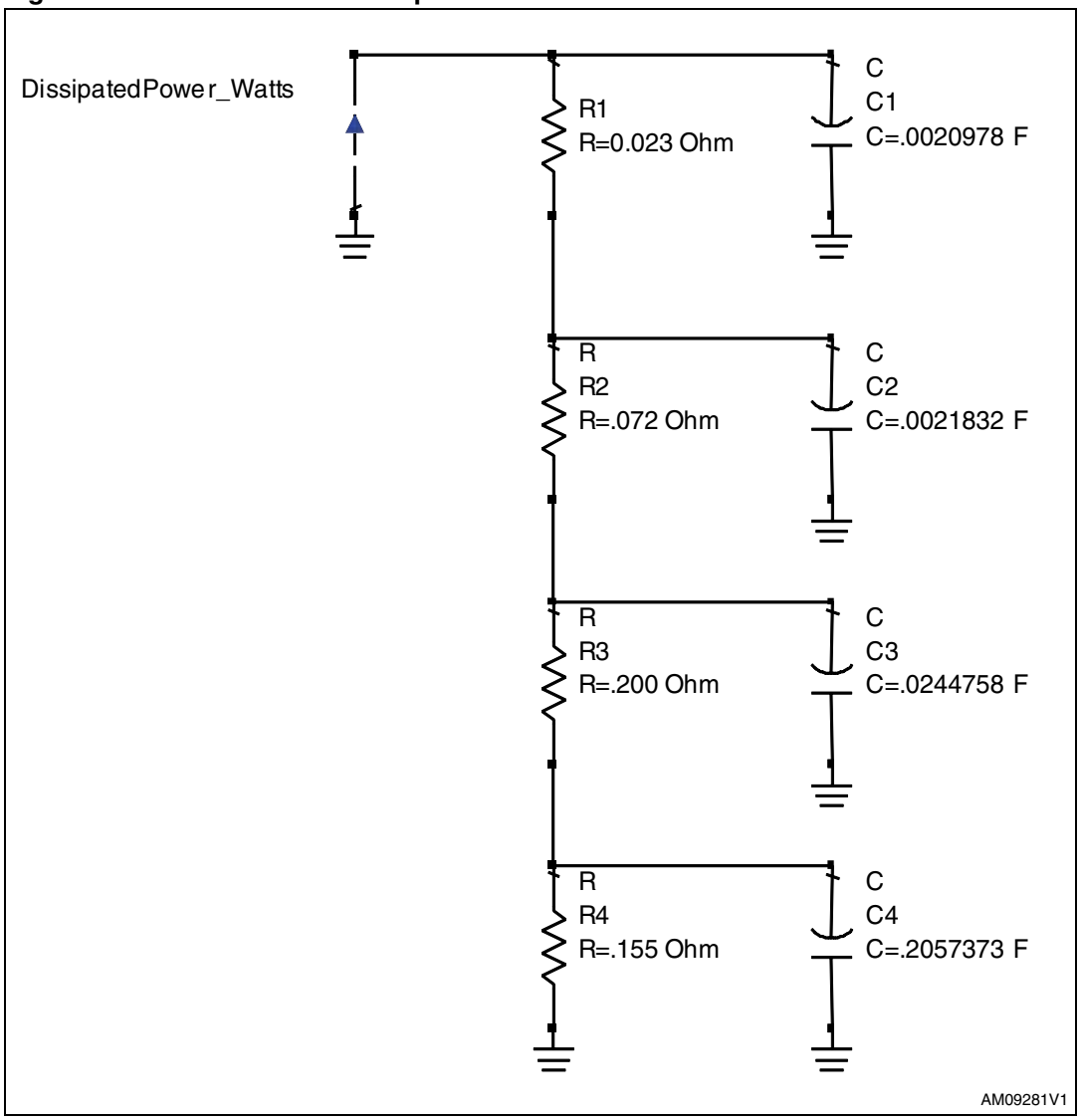


**Figure 4. Power gain and efficiency vs output power_Vdd = 50 V, Idq = 250 mA Freq = 175 MHz**

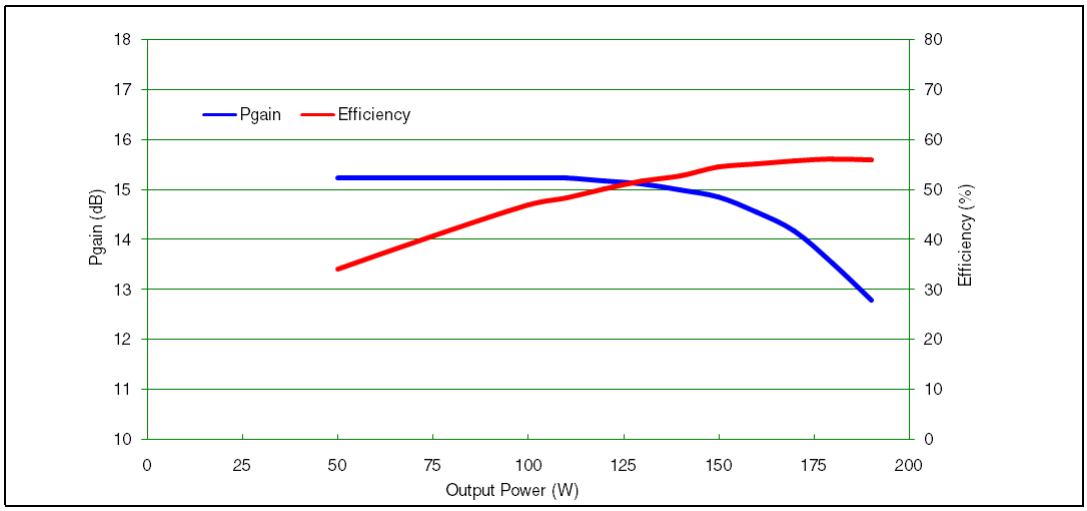



**Table 6. Vgs sort (@250 mA)**

| Marking | Min. | Max. |
|---|---|---|
| DD | 1.5 | 1.6 |
| EE | 1.6 | 1.7 |
| FF | 1.7 | 1.8 |
| A | 1.8 | 1.9 |
| B | 1.9 | 2 |
| C | 2 | 2.1 |
| D | 2.1 | 2.2 |
| E | 2.2 | 2.3 |
| F | 2.3 | 2.4 |
| G | 2.4 | 2.5 |
| H | 2.5 | 2.6 |
| I | 2.6 | 2.7 |
| J | 2.7 | 2.8 |
| K | 2.8 | 2.9 |
| L | 2.9 | 3 |
| M | 3 | 3.1 |
| N | 3.1 | 3.2 |
| O | 3.2 | 3.3 |
| P | 3.3 | 3.4 |
| Q | 3.4 | 3.5 |

Table 6. Vgs sort (@250 mA) (continued)

| Marking | Min. | Max. |
|---|---|---|
| R | 3.5 | 3.6 |
| S | 3.6 | 3.7 |
| T | 3.7 | 3.8 |
| U | 3.8 | 3.9 |
| V | 3.9 | 4 |

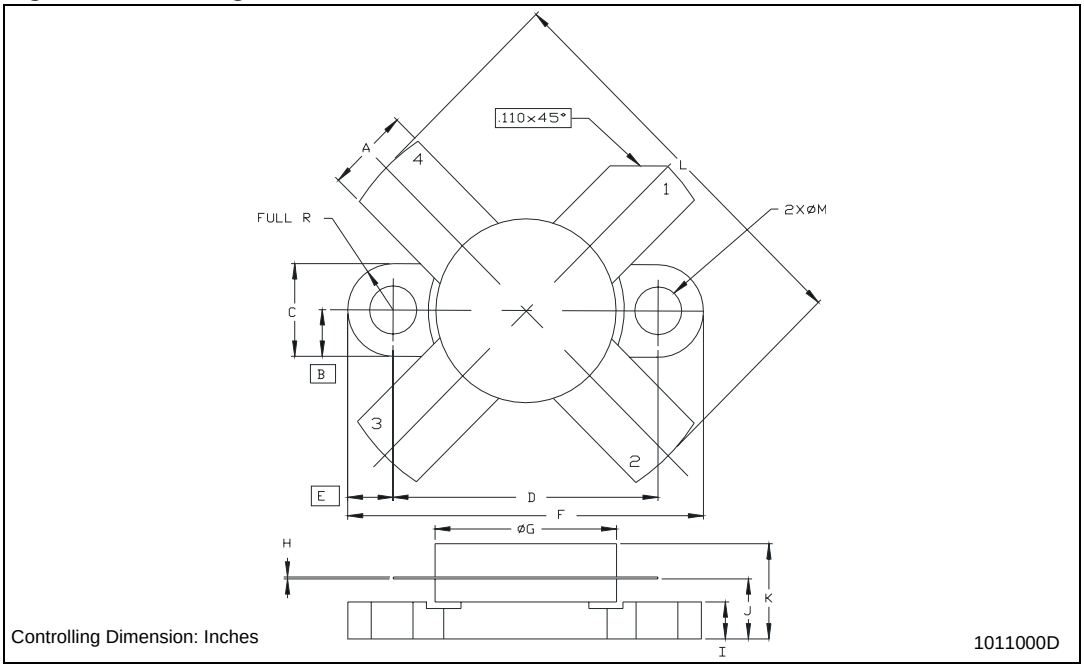
# 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

**Table 7. M174 (0.500 DIA 4/L N/HERM W/FLG) mechanical data**

| Dim. | mm. | | | Inch | | |
|---|---|---|---|---|---|---|
| | Min | Typ | Max | Min | Typ | Max |
| A | 5.56 | | 5.584 | 0.219 | | 0.230 |
| B | | 3.18 | | | 0.125 | |
| C | 6.22 | | 6.48 | 0.245 | | 0.255 |
| D | 18.28 | | 18.54 | 0.720 | | 0.730 |
| E | | 3.18 | | | 0.125 | |
| F | 24.64 | | 24.89 | 0.970 | | 0.980 |
| G | 12.57 | | 12.83 | 0.495 | | 0.505 |
| H | 0.08 | | 0.18 | 0.003 | | 0.007 |
| I | 2.11 | | 3.00 | 0.083 | | 0.118 |
| J | 3.81 | | 4.45 | 0.150 | | 0.175 |
| K | | | 7.11 | | | 0.280 |
| L | 25.53 | | 26.67 | 1.005 | | 1.050 |
| M | 3.05 | | 3.30 | 0.120 | | 0.130 |

**Figure 5. Package dimensions**



# 5 Marking, packing and shipping specifications

**Table 8. Packing and shipping specifications**

| Order code | Packaging | Pcs per tray | Dry pack humidity | $V_{GS}$ sort | Lot code |
|---|---|---|---|---|---|
| SD4931 | Plastic tray | 25 | < 10 % | Not mixed | Not mixed |

**Figure 6. Marking layout**

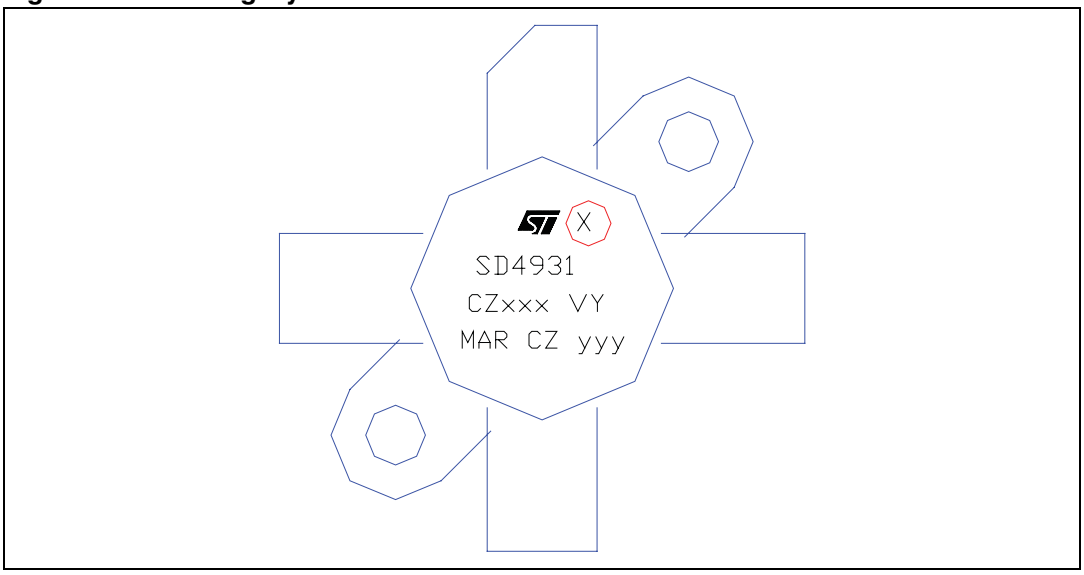



**Table 9. Marking specifications**

| Symbol | Description |
|---|---|
| X | $V_{GS}$ sort |
| CZ | Assy plant |
| xxx | Last 3 digit of diffusion lot |
| VY | Diffusion plant |
| MAR | Country of origin |
| CZ | Test and finishing plant |
| y | Assy year |
| yy | Assy week |

# 6 Revision history

**Table 10. Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 17-Mar-2008 | 1 | Initial release. |
| 14-Jan-2010 | 2 | Updated test conditions in *Table 5: Dynamic*. |
| 23-May-2011 | 3 | Inserted *Figure 2: Transient thermal impedance*, *Figure 3: Transient thermal impedance model* and *Section 5: Marking, packing and shipping specifications*. |

**Please Read Carefully:**

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

**UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.**

**UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.**

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.



STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

**www.st.com**