



SD3931-10

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

Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 175\text{ W}$ min. with 23 dB gain @ 150 MHz
- In compliance with the 2002/95/EC European directive

Description

The SD3931-10 is an N-channel MOS field-effect RF power transistor. It is intended for use in 100 V DC large signal applications up to 150 MHz.

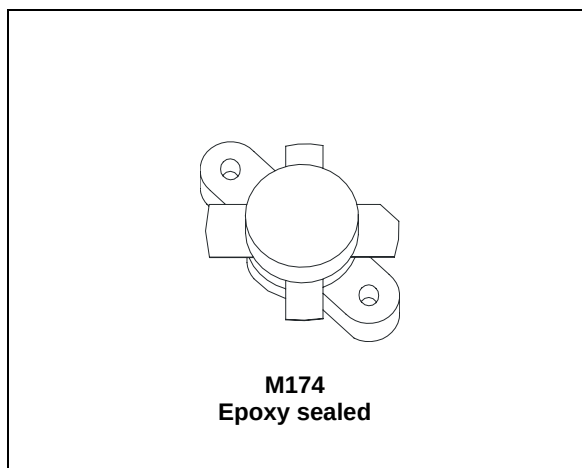


Figure 1. Pin connection

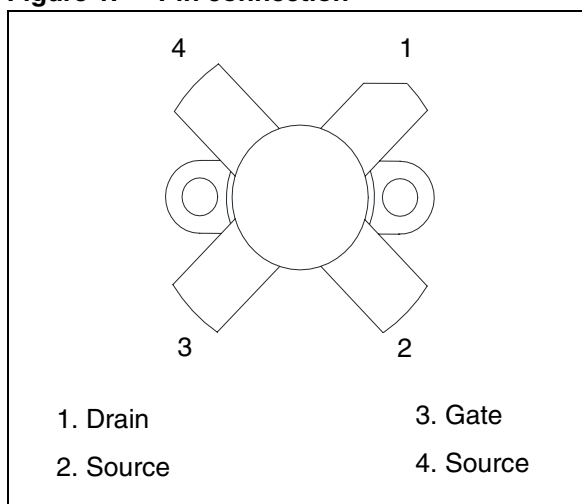


Table 1. Device summary

Order code	Marking	Package	Packaging
SD3931-10	SD3931-10	M174	Plastic tray

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1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings ($T_{CASE} = 25^{\circ}C$)

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}^{(1)}$	Drain source voltage	250	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 1M\Omega$)	250	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current	10	A
P_{DISS}	Power dissipation	389	W
T_J	Max. operating junction temperature	200	$^{\circ}C$
T_{STG}	Storage temperature	-65 to +150	$^{\circ}C$

1. $T_J = 150^{\circ}C$

1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	0.45	$^{\circ}C/W$

2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

2.1 Static

Table 4. Static (per side)

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(\text{BR})\text{DSS}}^{(1)}$	$V_{\text{GS}} = 0\text{ V}$	$I_{\text{DS}} = 100\text{ mA}$	250			V
I_{DSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$			1	mA
I_{GSS}	$V_{\text{GS}} = 20\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			250	nA
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 250\text{ mA}$	1.5	2.5	4.0	V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$	$I_{\text{D}} = 5\text{ A}$		2.5	3.5	V
G_{FS}	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 2.5\text{ A}$	2.5			S
C_{ISS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		500		pF
C_{OSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		134		pF
C_{RSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		6		pF

1. $T_{\text{J}} = 150^{\circ}\text{C}$

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min	Typ	Max	Unit
$P_{1\text{dB}}$	$V_{\text{DD}} = 100\text{ V}$ $I_{\text{DQ}} = 250\text{ mA}$ $f = 150\text{ MHz}$	175	230		W
G_{PS}	$V_{\text{DD}} = 100\text{ V}$ $I_{\text{DQ}} = 250\text{ mA}$ $P_{\text{OUT}} = 175\text{ W}$ $f = 150\text{ MHz}$	20	21.3		dB
η_{D}	$V_{\text{DD}} = 100\text{ V}$ $I_{\text{DQ}} = 250\text{ mA}$ $P_{\text{OUT}} = 175\text{ W}$ $f = 150\text{ MHz}$	50	57		%
Load mismatch	$V_{\text{DD}} = 100\text{ V}$ $I_{\text{DQ}} = 250\text{ mA}$ $P_{\text{OUT}} = 150\text{ W}$ $f = 150\text{ MHz}$ All phase angles	3:1			VSWR

3 Impedance data

Figure 2. Impedance data

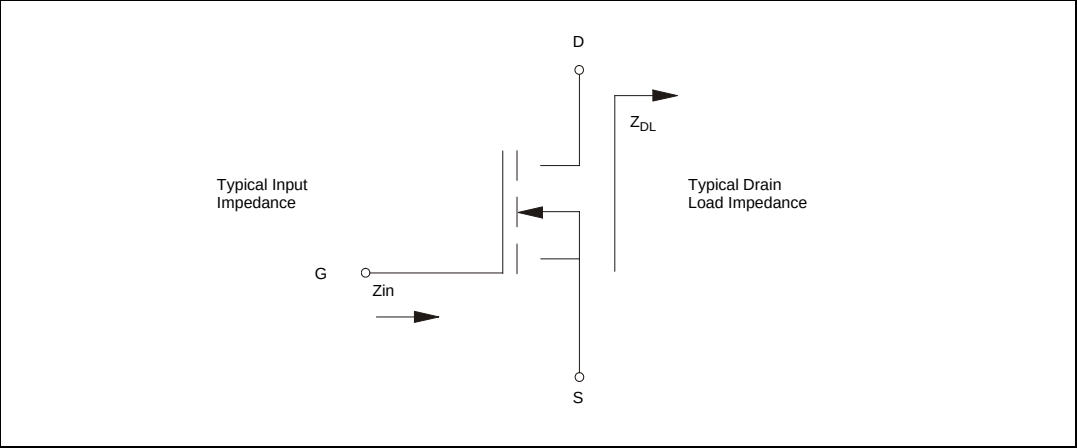


Table 6. Impedance data

Freq	$Z_{IN} (\Omega)$	$Z_{DL} (\Omega)$
150 MHz	$0.42 - j\ 3.1$	$3.4 + j\ 5.5$

4 Typical performance

Figure 3. Capacitances vs voltage

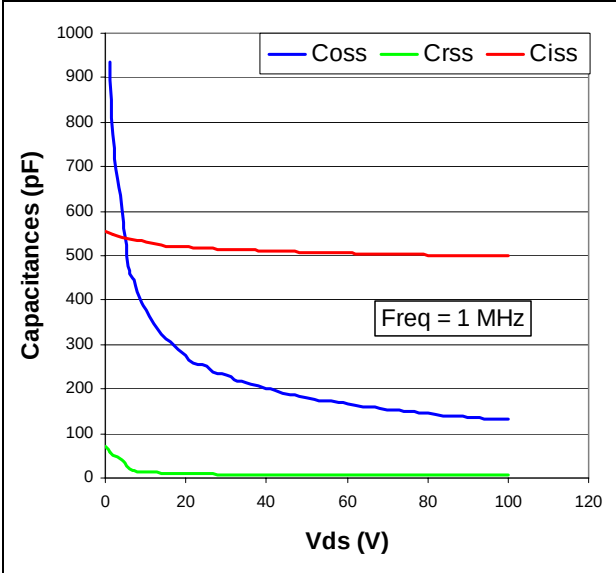


Figure 4. Gain vs output power and bias current

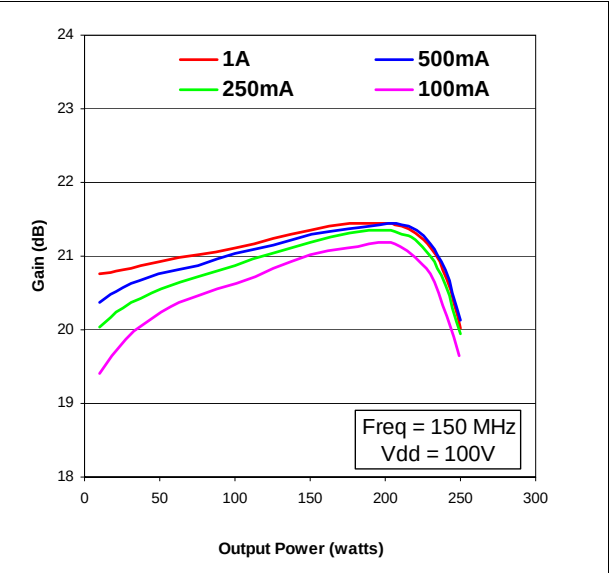


Figure 5. Output power and efficiency vs input power

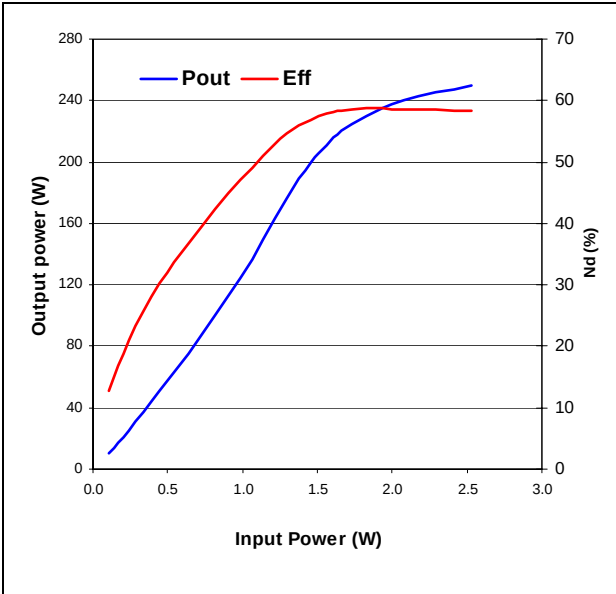


Figure 6. Zero temperature coefficient point

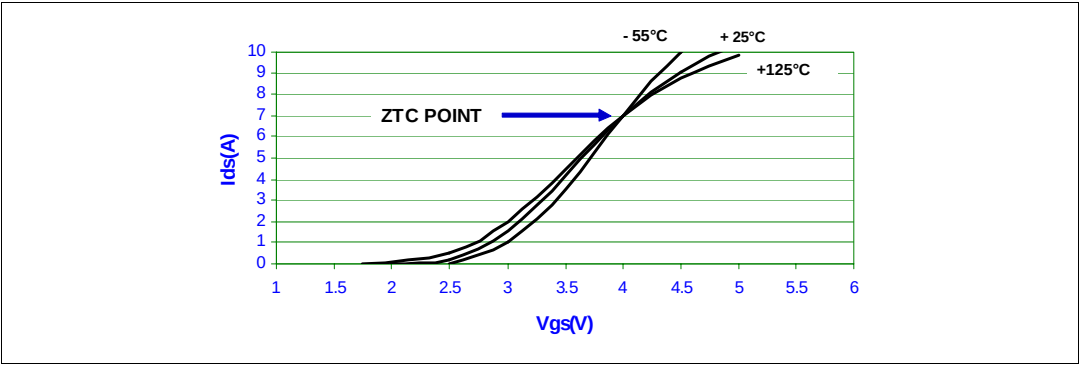


Table 7. Vgs sort (@250 mA)

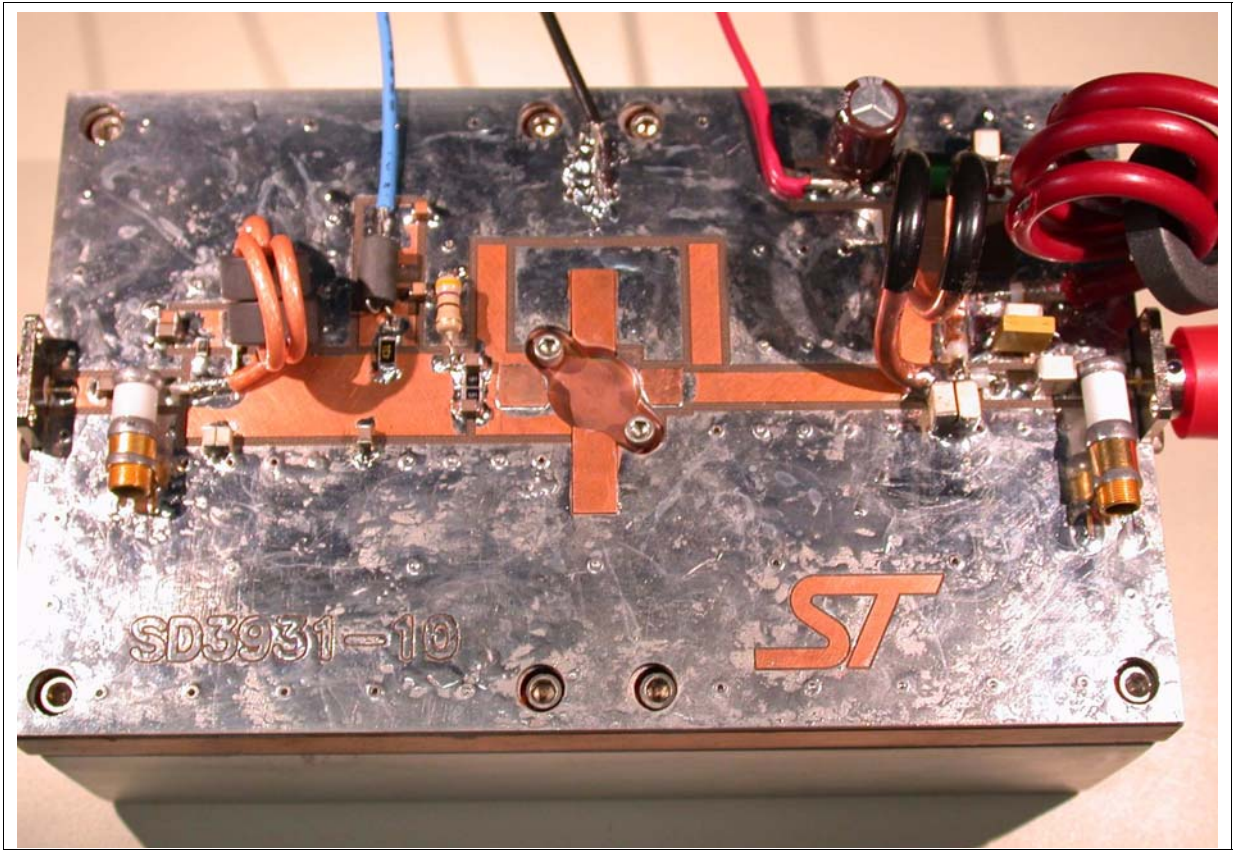
Marking	Min	Max
DD	1.5	1.6
EE	1.6	1.7
FF	1.7	1.8
A	1.8	1.9
B	1.9	2
C	2	2.1
D	2.1	2.2
E	2.2	2.3
F	2.3	2.4
G	2.4	2.5
H	2.5	2.6
I	2.6	2.7
J	2.7	2.8
K	2.8	2.9
L	2.9	3
M	3	3.1
N	3.1	3.2
O	3.2	3.3
P	3.3	3.4
Q	3.4	3.5
R	3.5	3.6
S	3.6	3.7
T	3.7	3.8
U	3.8	3.9
V	3.9	4

Table 8. Bill of materials (continued)

Component	Description
TL2	0.135" x 0.175" microstrip
TL3	0.225" x 0.175" microstrip
TL4	0.175" x 0.500" microstrip
TL5	0.805" x 0.500" microstrip
TL6	0.600" x 0.500" microstrip
TL7	0.420" x 0.500" microstrip
TL8	0.265" x 0.240" microstrip
TL9	1.550" x 0.180" microstrip
TL10	0.360" x 0.175" microstrip
TL11	0.300" x 0.175" microstrip
PCB	0.062" woven glass, copper clad, Er = 2.55

6 Circuit layout

Figure 8. Circuit layout photo

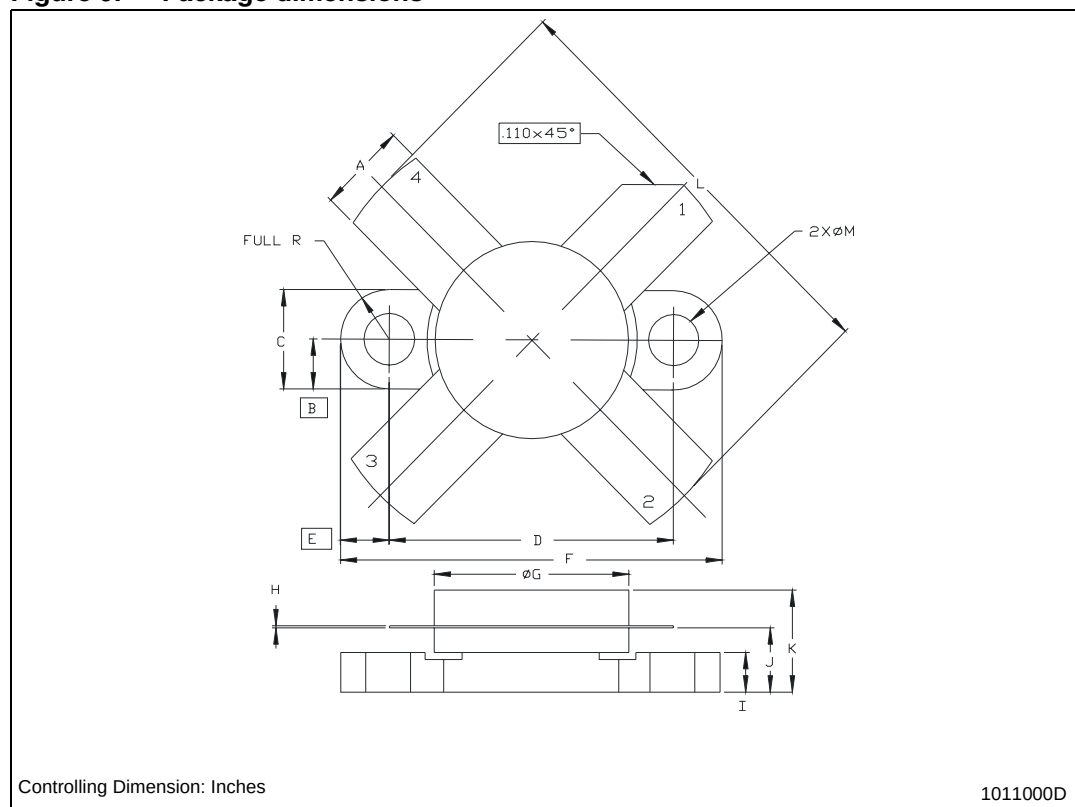


7 Package mechanical data

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

Table 9. 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 9. Package dimensions

8 Revision history

Table 10. Document revision history

Date	Revision	Changes
15-Jun-2007	1	First release
11-Jul-2007	2	Inserted Table 7: Vgs sort (@250 mA) on page 7
26-Oct-2007	3	Updated Table 4: Static (per side) on page 4 Added Section 5: Test circuit on page 8 , Section 6: Circuit layout on page 9
11-Jul-2008	4	Updated Table 4: Static (per side) on page 4
07-Sep-2010	5	Updated features on cover page.

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