STAC3933

RF power transistor: HF/VHF/UHF RF power N-channel MOSFETs

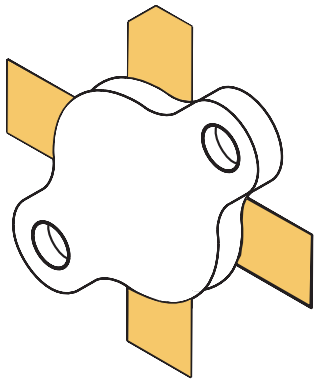
Preliminary data

Features

- Excellent thermal stability
- Common source configuration
- P_{OUT} = 350 W min. with 29 dB gain @ 30 MHz
- STAC air cavity packaging technology - STAC® package

Description

The STAC3933 is an N-channel MOS field-effect RF power transistor, intended for use in 100 V DC large signal applications up to 200 MHz.



STAC177B

Figure 1. Pin connection

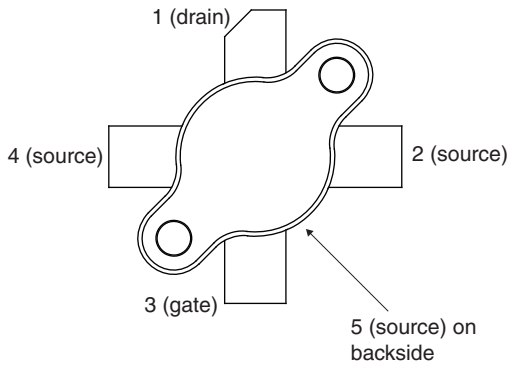


Table 1. Device summary

Order code	Marking	Base qty.	Package	Packaging[1]
STAC3933	STAC3933[1]	25 pcs	STAC177B	Plastic tray

1. For more details please refer to *Chapter 6: Marking, packing and shipping specifications.*.

Contents

1 Electrical data

1.1 Maximum ratings

(T_{CASE} = 25 °C)

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$(1)	Drain source voltage	250	V
V_{DGR}	Drain-gate voltage (R_{GS} = 1 MΩ)	250	V
V_{GS}	Gate-source voltage	±20	V
I_D	Drain current	20	A
P_{DISS}	Power dissipation	795	W
E_{AS}	Avalanche energy Single pulse (I_D = 50 A - 800 µH coil)	1000	mJ
T_J	Max. operating junction temperature	200	°C
T_{STG}	Storage temperature	-65 to +150	°C

1. T_J = 150 °C

1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	0.22	°C/W

2 Electrical characteristics

T_{CASE} = +25 °C

2.1 Static

Table 4. Static

Symbol	Test conditions			Min	Typ	Max	Unit
$V_{(BR)DSS}$(1)	V_{GS} = 0 V	I_{DS} = 100 mA		250			V
I_{DSS}	V_{GS} = 0 V	V_{DS} = 100 V				2	mA
I_{GSS}	V_{GS} = 20 V	V_{DS} = 0 V				500	nA
$V_{GS(Q)}$	V_{DS} = 10 V	I_D = 250 mA		1.5	2.5	4.0	V
$V_{DS(ON)}$	V_{GS} = 10 V	I_D = 10 A			2.5	3.5	V
G_{FS}	V_{DS} = 10 V	I_D = 5 A		5	8		S
C_{ISS}	V_{GS} = 0 V	V_{DS} = 100 V	f = 1 MHz		1000		pF
C_{OSS}	V_{GS} = 0 V	V_{DS} = 100 V	f = 1 MHz		265		pF
C_{RSS}	V_{GS} = 0 V	V_{DS} = 100 V	f = 1 MHz		13		pF

1. T_J = +150 °C

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min	Typ	Max	Unit
P_{OUT}	V_{DD} = 100 V I_{DQ} = 250 mA f = 30 MHz	350			W
G_{PS}	V_{DD} = 100 V I_{DQ} = 250 mA P_{OUT} = 350 W f = 30 MHz	25	29		dB
h_D	V_{DD} = 100 V I_{DQ} = 250 mA P_{OUT} = 350 W f = 30 MHz	60	66		%
Load mismatch	V_{DD} = 100 V I_{DQ} = 250 mA P_{OUT} = 300 W f = 30 MHz all phase angles	3:1			VSWR

Table 6. VGS/GFS sorts

Marking	Vgs(min)	Vgs(max)	Gfs(min)	Gfs(max)
A1	1.50	1.75	5	6
A2	1.50	1.75	6	7
A3	1.50	1.75	7	8
A4	1.50	1.75	8	9
A5	1.50	1.75	9	10
A6	1.50	1.75	10	11
A7	1.50	1.75	11	12
A8	1.50	1.75	12	13
A9	1.50	1.75	13	14
B1	1.75	2.00	5	6
B2	1.75	2.00	6	7
B3	1.75	2.00	7	8
B4	1.75	2.00	8	9
B5	1.75	2.00	9	10
B6	1.75	2.00	10	11
B7	1.75	2.00	11	12
B8	1.75	2.00	12	13
B9	1.75	2.00	13	14
C1	2.00	2.25	5	6
C2	2.00	2.25	6	7
C3	2.00	2.25	7	8
C4	2.00	2.25	8	9
C5	2.00	2.25	9	10
C6	2.00	2.25	10	11
C7	2.00	2.25	11	12
C8	2.00	2.25	12	13
C9	2.00	2.25	13	14
D1	2.25	2.50	5	6
D2	2.25	2.50	6	7
D3	2.25	2.50	7	8
D4	2.25	2.50	8	9
D5	2.25	2.50	9	10
D6	2.25	2.50	10	11
D7	2.25	2.50	11	12

Table 6. VGS/GFS sorts (continued)

Marking	Vgs(min)	Vgs(max)	Gfs(min)	Gfs(max)
D8	2.25	2.50	12	13
D9	2.25	2.50	13	14
E1	2.50	2.75	5	6
E2	2.50	2.75	6	7
E3	2.50	2.75	7	8
E4	2.50	2.75	8	9
E5	2.50	2.75	9	10
E6	2.50	2.75	10	11
E7	2.50	2.75	11	12
E8	2.50	2.75	12	13
E9	2.50	2.75	13	14
F1	2.75	3.00	5	6
F2	2.75	3.00	6	7
F3	2.75	3.00	7	8
F4	2.75	3.00	8	9
F5	2.75	3.00	9	10
F6	2.75	3.00	10	11
F7	2.75	3.00	11	12
F8	2.75	3.00	12	13
F9	2.75	3.00	13	14
G1	3.00	3.25	5	6
G2	3.00	3.25	6	7
G3	3.00	3.25	7	8
G4	3.00	3.25	8	9
G5	3.00	3.25	9	10
G6	3.00	3.25	10	11
G7	3.00	3.25	11	12
G8	3.00	3.25	12	13
G9	3.00	3.25	13	14
H1	3.25	3.50	5	6
H2	3.25	3.50	6	7
H3	3.25	3.50	7	8
H4	3.25	3.50	8	9
H5	3.25	3.50	9	10
H6	3.25	3.50	10	11

Table 6. VGS/GFS sorts (continued)

Marking	Vgs(min)	Vgs(max)	Gfs(min)	Gfs(max)
H7	3.25	3.50	11	12
H8	3.25	3.50	12	13
H9	3.25	3.50	13	14
I1	3.50	3.75	5	6
I2	3.50	3.75	6	7
I3	3.50	3.75	7	8
I4	3.50	3.75	8	9
I5	3.50	3.75	9	10
I6	3.50	3.75	10	11
I7	3.50	3.75	11	12
I8	3.50	3.75	12	13
I9	3.50	3.75	13	14
J1	3.75	4.00	5	6
J2	3.75	4.00	6	7
J3	3.75	4.00	7	8
J4	3.75	4.00	8	9
J5	3.75	4.00	9	10
J6	3.75	4.00	10	11
J7	3.75	4.00	11	12
J8	3.75	4.00	12	13
J9	3.75	4.00	13	14

3 Impedance data

Figure 2. Impedance data

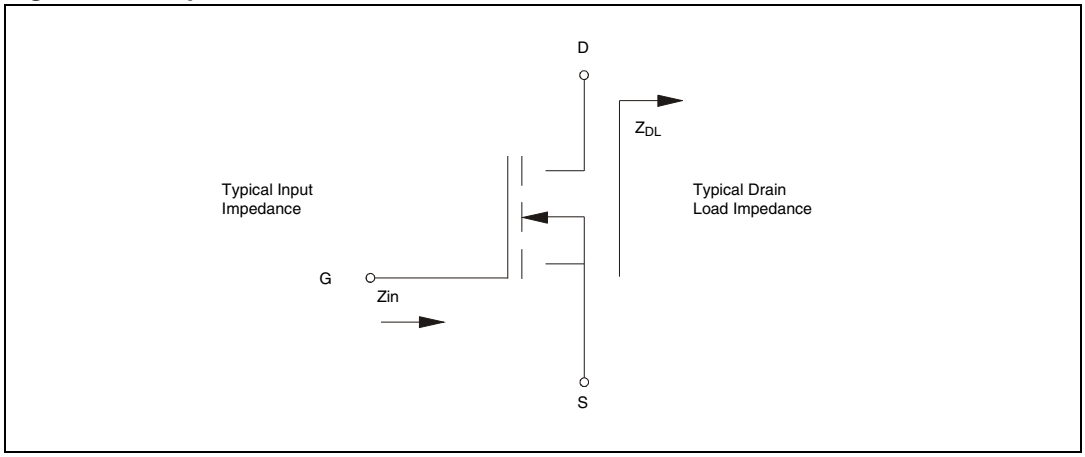


Table 7. Impedance data (350 W load line)

Frequency	Z_{IN} (Ω)	Z_{DL} (Ω)
10 MHz	6.56 - j9.75	12.17 + j2.76
20 MHz	2.80 - j5.78	10.6 + j4.81
30 MHz	1.96 - j3.90	8.73 + j5.94
40 MHz	1.69 - j2.89	7.00 + j6.35
50 MHz	1.59 - j2.30	5.58 + j6.32
60 MHz	1.55 - j1.93	4.47 + j6.06
70 MHz	1.55 - j1.71	3.62 + j5.72
80 MHz	1.54 - j1.58	2.97 + j5.35
90 MHz	1.53 - j1.50	2.46 + j4.99
100 MHz	1.52 - j1.45	2.07 + j4.65

4 Typical performance

Figure 3. Capacitance vs. supply voltage

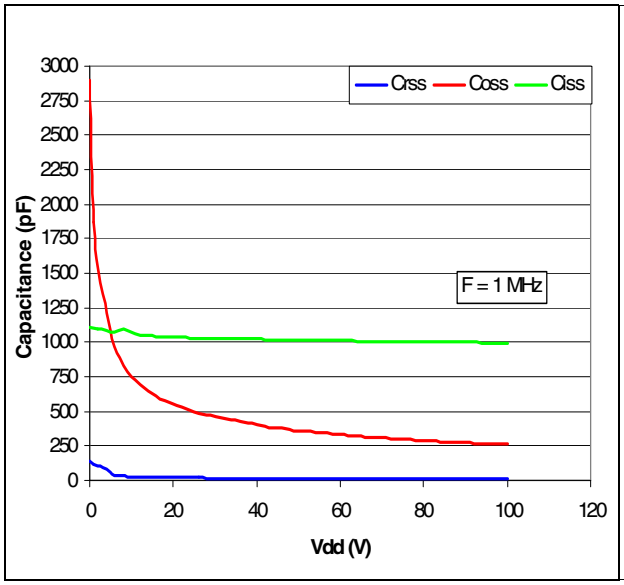


Figure 4. Drain current vs. gate source voltage

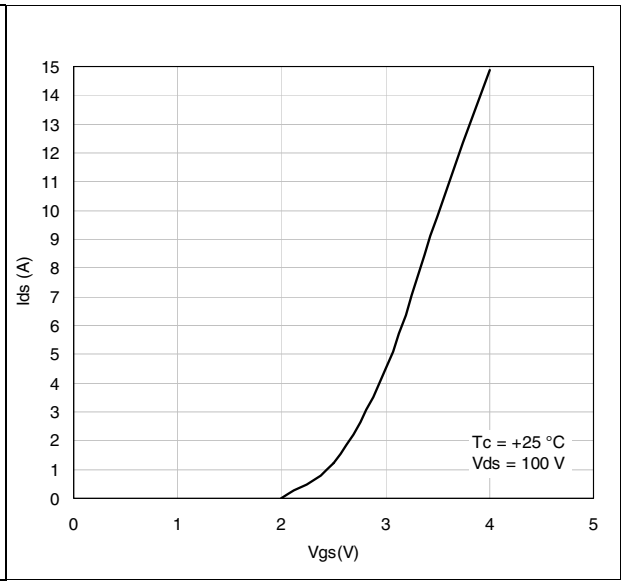


Figure 5. Drain current vs. drain source voltage

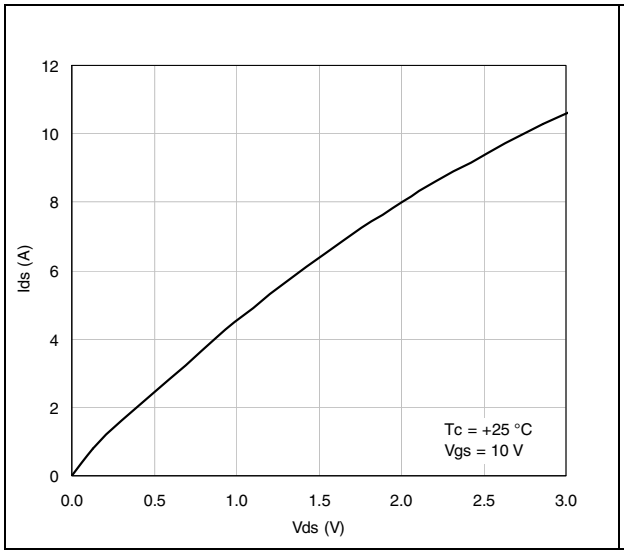
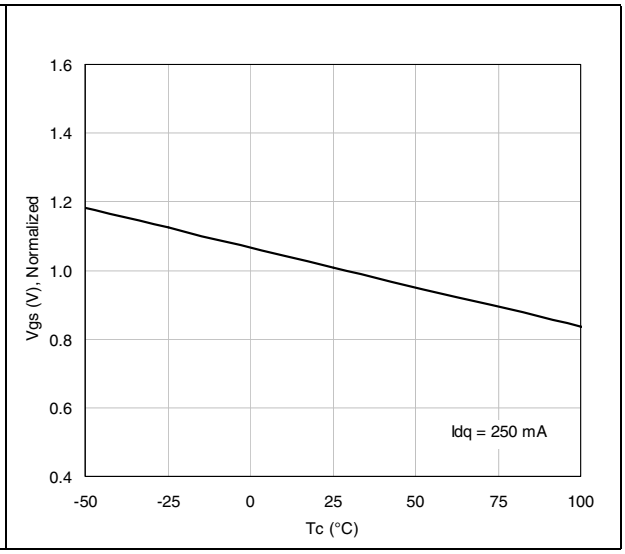


Figure 6. Gate source voltage vs. case temperature



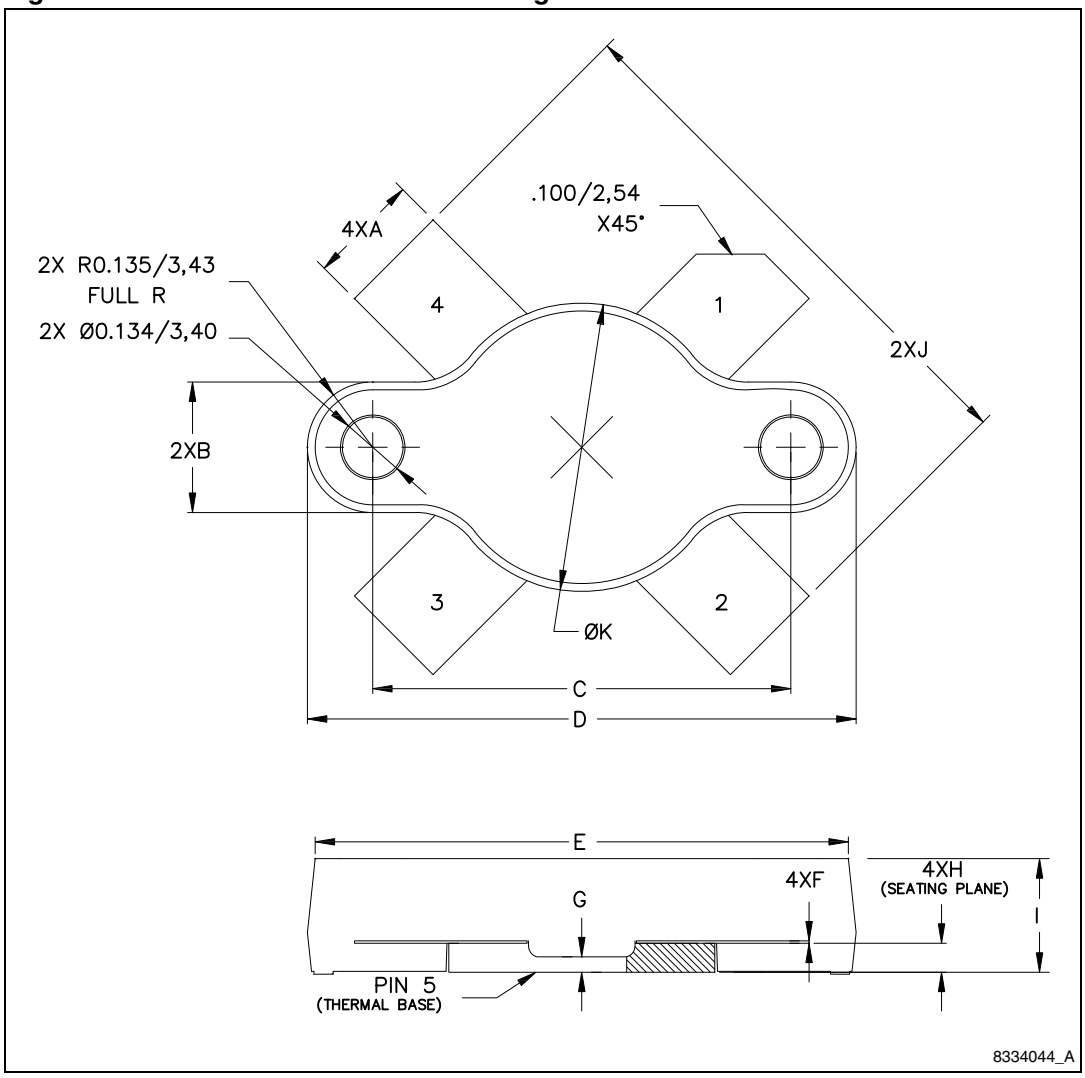
5 Package mechanical data

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 8. STAC177B mechanical data

Dim	mm			inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	5.72		5.97	0.225		0.235
B	6.73		6.99	0.265		0.275
C	21.84		22.10	0.860		0.870
D	28.70		28.96	1.130		1.140
E		28.02			1.103	
F	0.10		0.15	0.004		0.006
G		0.81			0.032	
H	1.45		1.70	0.057		0.067
I	5.79		6.15	0.228		0.242
J	27.43		28.45	1.080		1.120
K	15.01		15.27	0.591		0.601

Figure 7. STAC177B mechanical drawing



6 Marking, packing and shipping specifications

Table 9. Packing and shipping specifications

Order code	Packaging	Pcs per tray	Dry pack humidity	VGS and GFS code	Lot code
STAC3933	Plastic tray	25	< 10 %	Not mixed	Not mixed

Figure 8. Marking layout

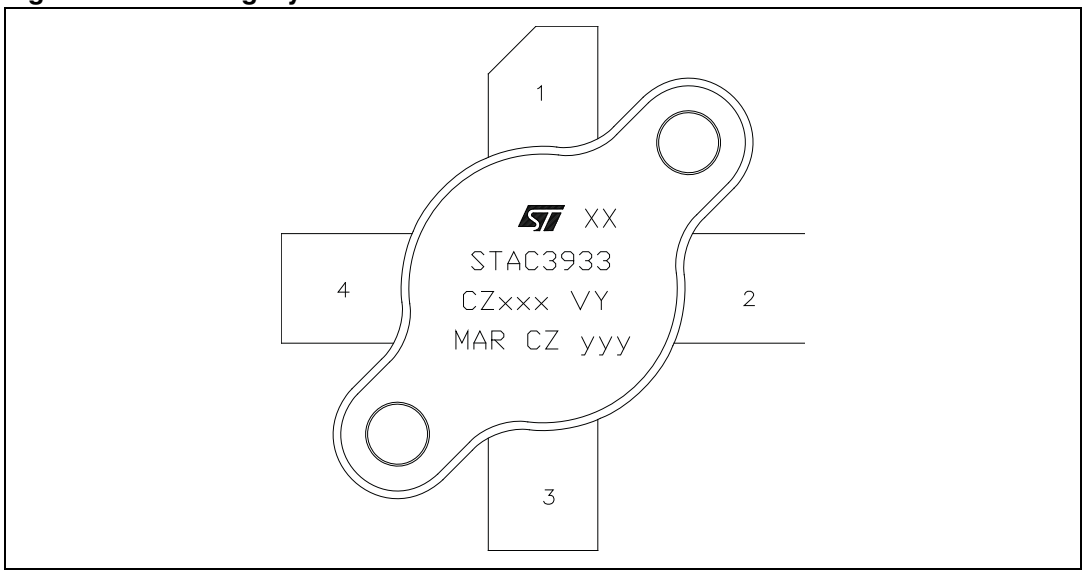


Table 10. Marking specifications

Symbol	Description
XX	V_{GS} and G_{FS} sort
CZ	Assembly plant
xxx	Last 3 digit of diffusion lot
VY	Diffusion plant
MAR	Country of origin
CZ	Test and finishing plant
y	Assembly year
yy	Assembly week

7 Revision history

Table 11. Document revision history

Date	Revision	Changes
17-Jan-2012	1	First release.

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