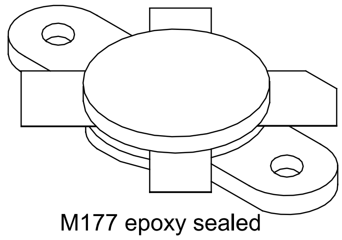
SD2943

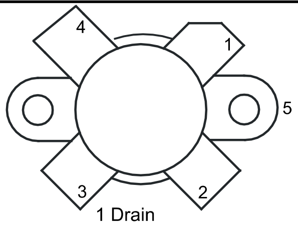
HF/VHF/UHF RF power N-channel MOSFET

Datasheet - production data



M177 epoxy sealed

Figure 1: Pin connection



Features

- High power capability
- P_{OUT} = 350 W min. with 22 dB gain@30 MHz
- P_{SAT} = 450 W
- Low $R_{DS(on)}$
- Thermally enhanced packing for lower junction temperatures
- Gold metallization
- Excellent thermal stability
- Common source configuration

Description

The SD2943 is a gold metallized N-channel MOS field-effect RF power transistor. It is used for 50 V DC large signal applications up to 150 MHz. The SD2943 offers a 20% higher power saturation than the SD2933, and is ideal for ISM applications where reliability and ruggedness are critical factors.

Table 1: Device summary

Order code	Marking	Package	Packing
SD2943W	SD2943(1)	M177	Plastic tray

Notes:

(1)For more details please refer to *Section 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	130	V
V_{DGR}	Drain-gate voltage (R_{GS} = 1 MΩ)	130	V
V_{GS}	Gate-source voltage	±40	V
I_D	Drain current	40	A
P_{DISS}	Power dissipation	648	W
T_J	Max. operating junction temperature	+200	°C
E_{AS}	Avalanche energy, single pulse (ID = 53 A, 800 µH coil)	1100	mJ
T_{STG}	Storage temperature	-65 to +150	°C

Notes:

(1) T_J = 150 °C

1.2 Thermal data

Table 3: Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction-to-case thermal resistance	0.27	°C/W

2 Electrical characteristics

T_{CASE} = 25 °C

Table 4: Static

Symbol	Test conditions			Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$[(1)]	V_{GS} = 0 V	I_{DS} = 200 mA		130			V
I_{DSS}	V_{GS} = 0 V	V_{DS} = 50 V				200	µA
I_{GSS}	V_{GS} = 20 V	V_{DS} = 0 V				500	nA
$V_{GS(Q)}$	V_{DS} = 10 V	I_D = 250 mA		2		4	V
$V_{DS(ON)}$	V_{GS} = 10 V	I_D = 20 A				2	V
G_{FS}	V_{DS} = 10 V	I_D = 10 A		10			mho
C_{ISS}	V_{GS} = 0 V	V_{DS} = 50 V	f = 1 MHz		830		pF
C_{OSS}	V_{GS} = 0 V	V_{DS} = 50 V	f = 1 MHz		470		pF
C_{RSS}	V_{GS} = 0 V	V_{DS} = 50 V	f = 1 MHz		35		pF

Notes:

(1) T_J = 150 °C

Table 5: Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	V_{DD} = 50 V I_{DQ} = 250 mA f = 30 MHz	350	450		W
G_{PS}	V_{DD} = 50 V I_{DQ} = 250 mA P_{OUT} = 350 W f = 30 MHz	22	25		dB
η_D	V_{DD} = 50 V I_{DQ} = 250 mA P_{OUT} = 350 W f = 30 MHz	60	65		%
Load mismatch	V_{DD} = 50 V I_{DQ} = 250 mA P_{OUT} = 350 W f = 30 MHz All phase angles	3:1			VSWR

Table 6: G_{FS} sorts

Symbol	Value
A	10 to 10.99
B	11 to 11.99
C	12 to 12.99
D	13 to 13.99
E	14 to 14.99
F	15 to 15.99
G	16 to 16.99
H	17 to 18

3 Impedance data

Figure 2: Impedance data

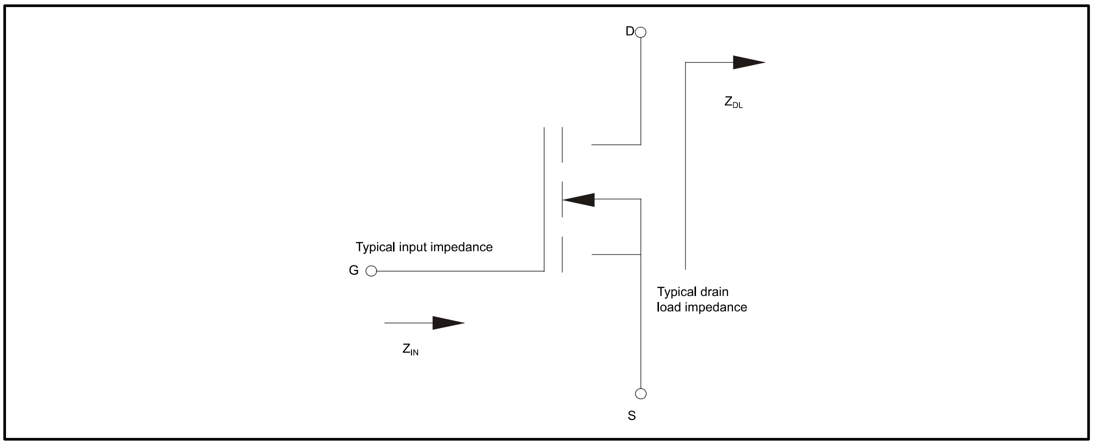


Table 7: Impedance data

f	$Z_{IN}(\Omega)$	$Z_{DL}(\Omega)$
30 MHz	1.3 - j 2.9	3.1 + j 2.3
108 MHz	1.4 - j 2.4	1.9 + j 1.4
175 MHz	1.4 - j 2.2	1.7 + j 1.6

4 Typical performance

Figure 3: Capacitance vs. drain voltage

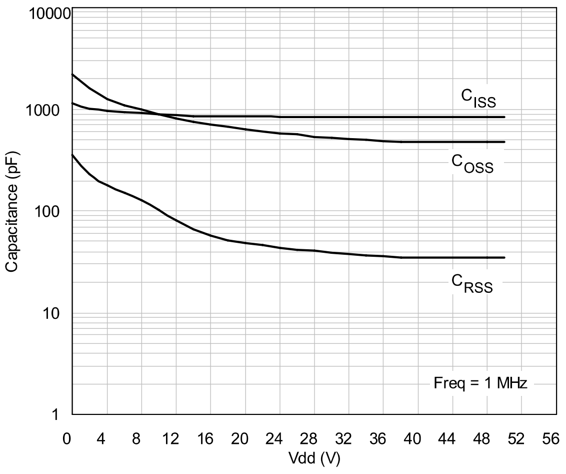


Figure 4: Drain current vs. gate voltage

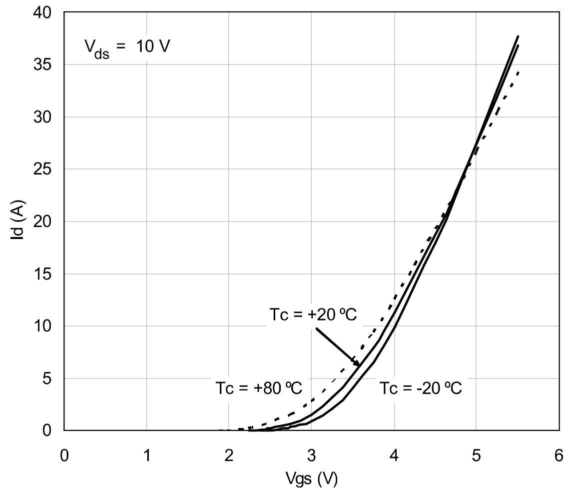


Figure 5: Gate-source voltage vs. case temperature

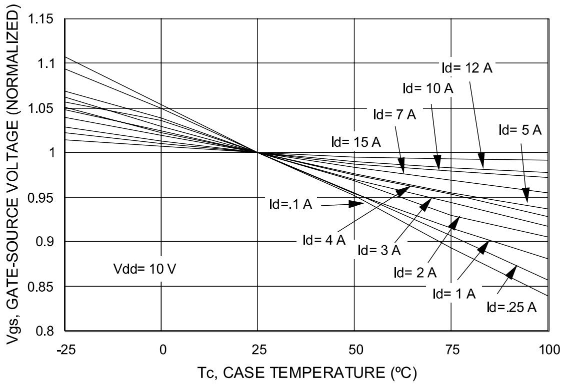


Figure 6: Maximum thermal resistance vs. case temperature

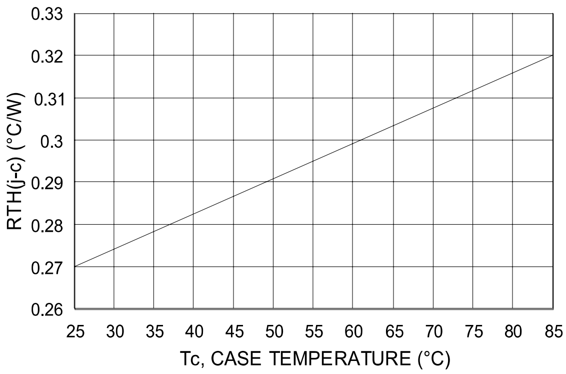


Figure 7: Output power vs. input power

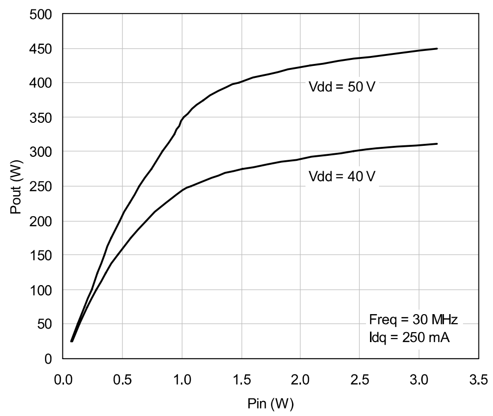


Figure 8: Output power vs. input power (at different temperature)

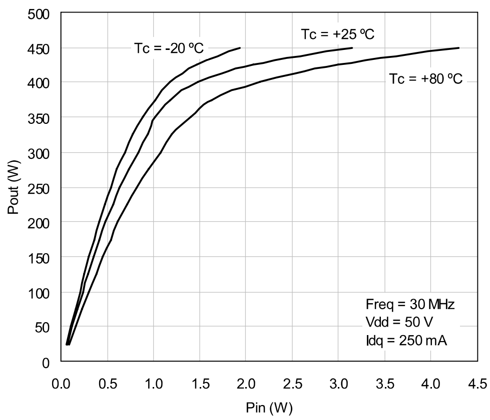


Figure 9: Power gain vs. output power

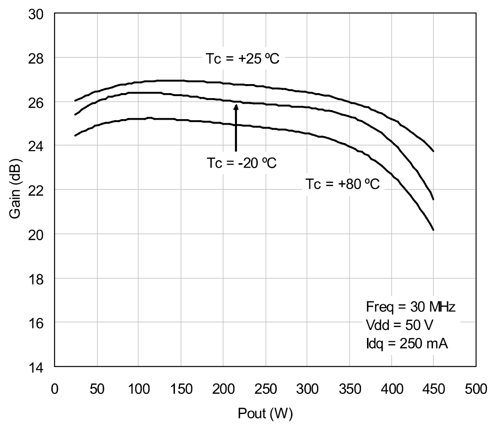


Figure 10: Efficiency vs. output power

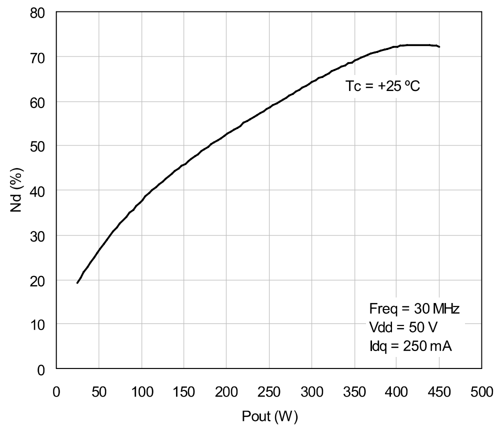


Figure 11: Output power vs. supply voltage

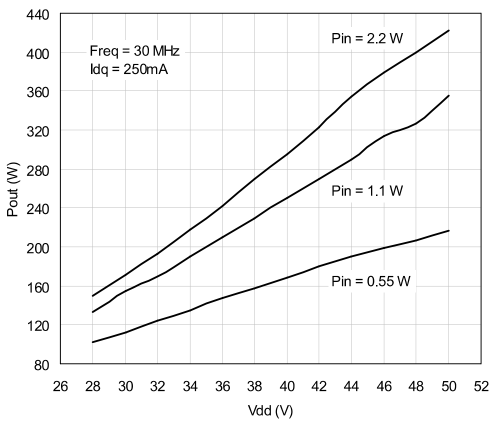
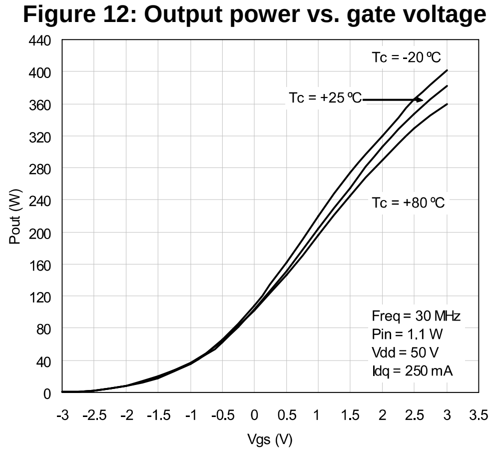
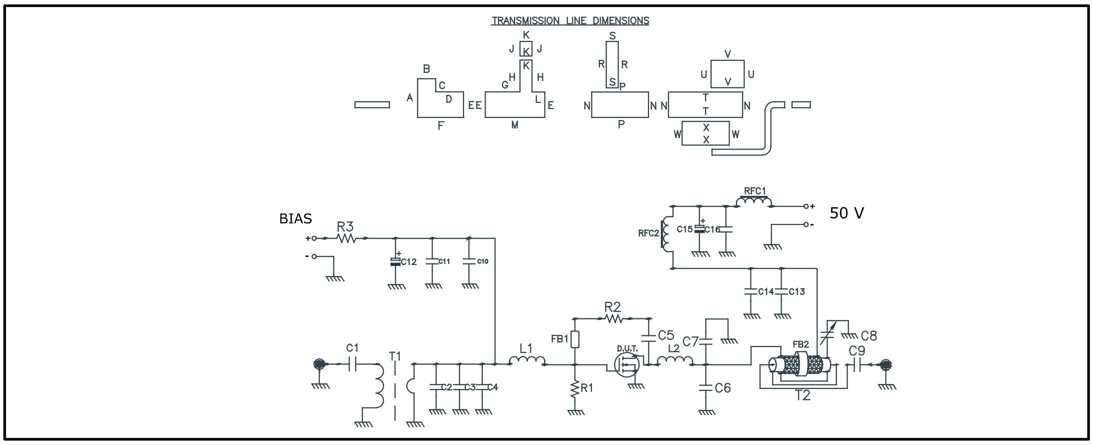


Figure 12: Output power vs. gate voltage



5 Test circuit (175 MHz)

Figure 13: 30 MHz test circuit schematic



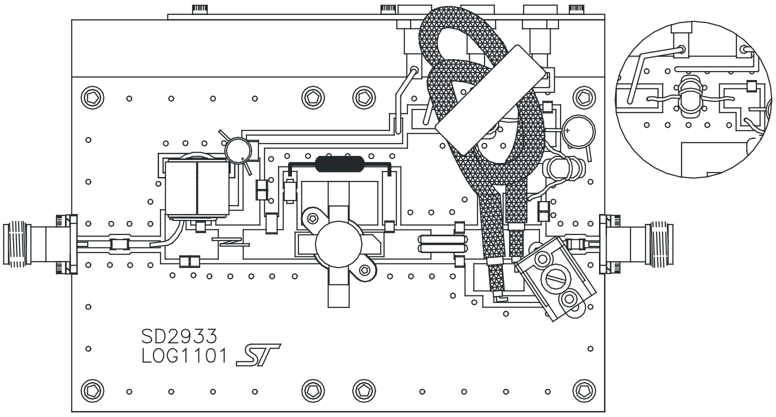
Dimensions at component symbols are references for component placement. Gap between ground and transmission files are 0.056[1.42] (typ.). Transmission line is not 1:1 scale. Input and output transmission line are 50 Ω.

Table 8: 30 MHz test circuit part list

Component	Description
C1, C9	0.01 µF / 500 V surface mount ceramic chip capacitor
C2, C3	750 pF ATC 700B surface mount ceramic chip capacitor
C4	300 pF ATC 700B surface mount ceramic chip capacitor
C5, C10, C11, C14, C16	10000 pF ATC 200B surface mount ceramic chip capacitor
C6	510 pF ATC 700B surface mount ceramic chip capacitor
C7	300 pF ATC 700B surface mount ceramic chip capacitor
C8	175-680 pF type 46 standard trimmer capacitor
C12	47 µF / 63 V aluminum electrolytic radial lead capacitor
C13	1200 pF ATC 700B surface mount ceramic chip capacitor
C15	100 µF / 63 V aluminum electrolytic radial lead capacitor
R1, R3	1 kΩ 1 W surface mount chip resistor
R2	560 Ω 2 W wire-wound axil lead resistor
T1	HF 2-30 MHz surface mount 9:1 transformer
T2	RG - 142B/U 50 Ω coaxial cable OD = 0.165[4.18] L 15”[381.00] covered with 15”[381.00] tinned copper tubular brand 13/65” [5.1] width
L1	1 3/4 turn air-wound 16 AWG ID = 0.219 [5.56] poly-coated magnet wire
L2	1 3/4 turn air-wound 12 AWG ID = 0.250 [6.34] bus bar wire
RFC1, RFC2	3 turns 14 AWG wire through fair rite toroid
FB1	Surface mount shield bead

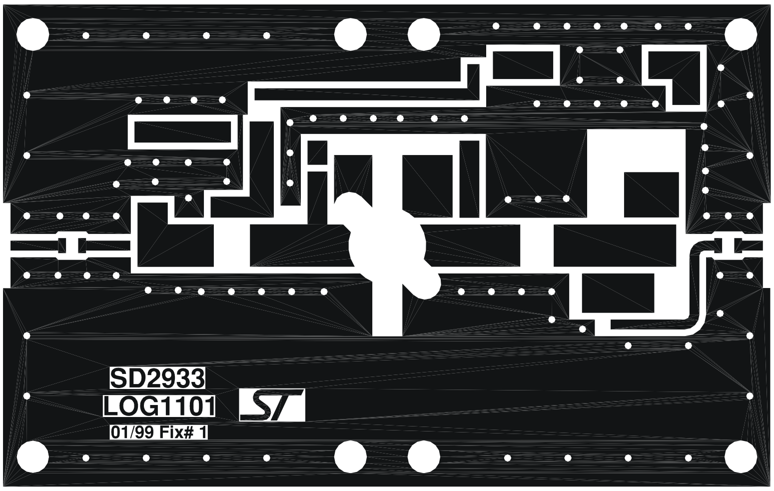
Component	Description
FB2	Toroid
PCB	ULTRALAM 2000. 0.030” THK, εr = 2.55, 2 Oz ED CU both sides

Figure 14: 30 MHz test circuit



Both the SD2933 and the SD2943 device use the same PCB.

Figure 15: 30 MHz test circuit photomaster



6 Marking, packing and shipping specifications

Table 9: Packing and shipping specifications

Order code	Packing	Pieces per tray	Dry pack humidity	G_{FS} code	Lot code
SD2943W	Plastic tray	25	< 10%	Not mixed	Not mixed

Figure 16: SD2943 marking layout

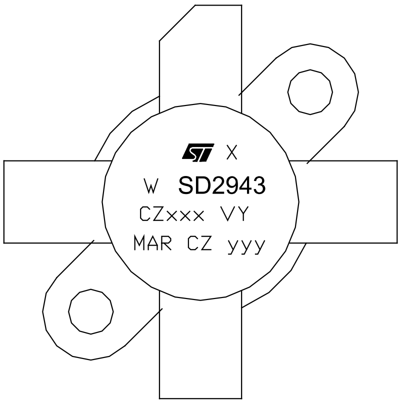


Table 10: Marking specifications

Symbol	Description
W	Wafer process code
X	G_{FS} sort
CZ	Assembly plant
xxx	Last 3 digits of diffusion lot
VY	Diffusion plant
MAR	Country of origin
CZ	Test and finishing plant
y	Assembly year
yy	Assembly week

7 Package information

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.

7.1 M177 (.550 DIA 4L NHERM WFLG) package information

Figure 17: M177 (.550 DIA 4L N/HERM W/FLG) package outline

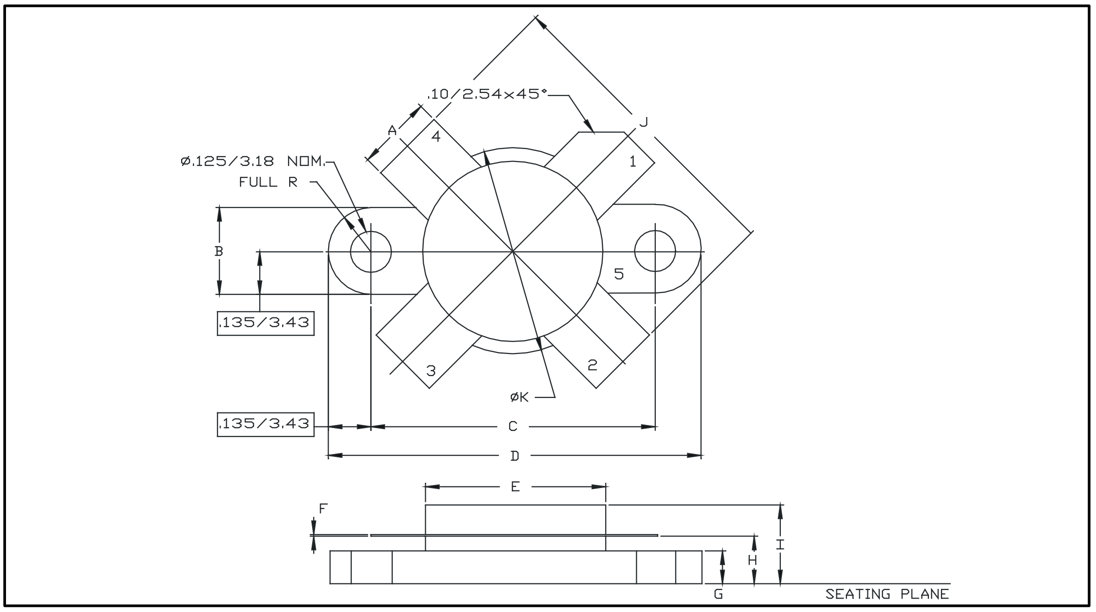


Table 11: M177 (.550 DIA 4L N/HERM W/FLG) package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	5.72		5.97
B	6.73		6.96
C	21.84		22.10
D	28.70		28.96
E	13.84		14.10
F	0.08		0.18
G	2.49		2.74
H	3.81		4.32
I			7.11
J	27.43		28.45
K	15.88		16.13

8 Revision history

Table 12: Document revision history

Date	Revision	Changes
18-Oct-2005	1	First issue.
04-Jan-2006	2	Complete version.
24-Aug-2011	3	Inserted *Chapter 7: Marking, packing and shipping specifications*. Minor text changes.
10-Aug-2015	4	Updated *Table 2.: Absolute maximum rating*. Minor text changes.
02-Dec-2016	5	Updated *Table 2: "Absolute maximum ratings"*. Minor text changes.

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