STAC250V2-500E

500 W, 250 V SuperDMOS transistor

Datasheet - production data

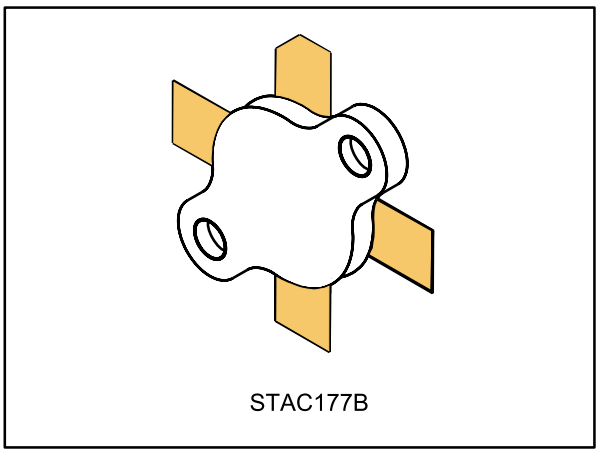
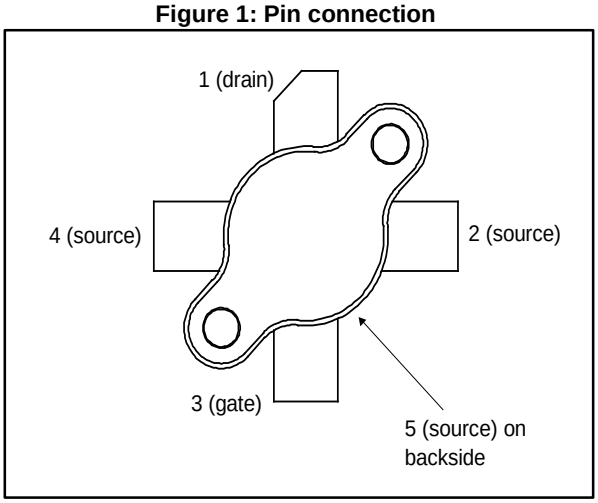


Figure 1: Pin connection



Description

The STAC250V2-500E uses the latest RF Power SuperDMOS technology specially designed for 150 V and 250 V industrial RF power Class-C, D and E generators such as PECVD, plasma sputtering, flat panel and solar cell manufacturing equipment. The STAC250V2-500E benefits from the latest generation of STAC® air cavity packaging, which exhibits a 25% lower thermal resistance compared to equivalent ceramic packages.

Table 1: Device summary

Order code	Marking	Package	Packaging
STAC250V2-500E	250V2-500 (1)	STAC177B	Plastic tray

Notes:

(1)For more details please refer to *Section 6: "Marking, packing and shipping specifications"*.

Features

- Operating frequency up to 27 MHz
- P_{OUT} = 450 W with 23 dB gain @ 13.56 MHz/250 V
- Designed for Class-C, D and E operation
- $V_{(BR)DSS}$ > 900 V
- Housed in STAC® package, using air cavity packaging technology
- In compliance with the 2002/95/EC1 European Directive

Contents

1 Electrical data

1.1 Maximum ratings

(T_{CASE} = 25 ° C)

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	900	V
V_{GS}	Gate-source voltage	± 20	V
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	TBD	° C/W

2 Electrical characteristics

T_{CASE} = +25 °C

2.1 Static

Table 4: Static

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	I_{DS} = 250 µ A	900			V
I_{DSS}	V_{GS} = 0 V; V_{DS} = 750 V			1	µ A
I_{GSS}	V_{GS} = 20 V; V_{DS} = 0 V			1	µ A
V_{TH}	I_D = 250 µ A	3	4.7	6	V
$V_{DS(ON)}$	V_{GS} = 10 V ; I_D = 7 A		4.2	5	V
G_{FS}	V_{DS} = 7 V ; I_D = 3.5 A		4.4		S
C_{ISS}	V_{GS} = 0 V; V_{DS} = 150 V ; f = 1 MHz		980		pF
C_{OSS}	V_{GS} = 0 V; V_{DS} = 150 V ; f = 1 MHz		140		pF
C_{RSS}	V_{GS} = 0 V; V_{DS} = 150 V ; f = 1 MHz		1		pF

2.2 Dynamic

Frequency = 13.56 MHz Class-C

Table 5: Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	V_{DD} = 150 V, P_{IN} = 3.5 W	450	500	-	W
	V_{DD} = 250 V, P_{IN} = 2.5 W	450	600	-	
Gain	V_{DD} = 150 V, P_{IN} = 3.5 W		21.5	-	dB
	V_{DD} = 250 V, P_{IN} = 2.5 W		23.5	-	
Efficiency	V_{DD} = 150 V, P_{OUT} = 3.5 W	70	78	-	%
	V_{DD} = 250 V, P_{OUT} = 2.5 W		75	-	%
Load mismatch	V_{DD} = 150 V, P_{OUT} = 450 W		10:1 (1) 65:1	-	VSWR
	V_{DD} = 250 V, P_{OUT} = 450 W		3:1 20:1(1)	-	

Notes:

(1)Under pulse conditions: 1 ms - 10%.

3 Impedance data

Figure 2: Impedance data

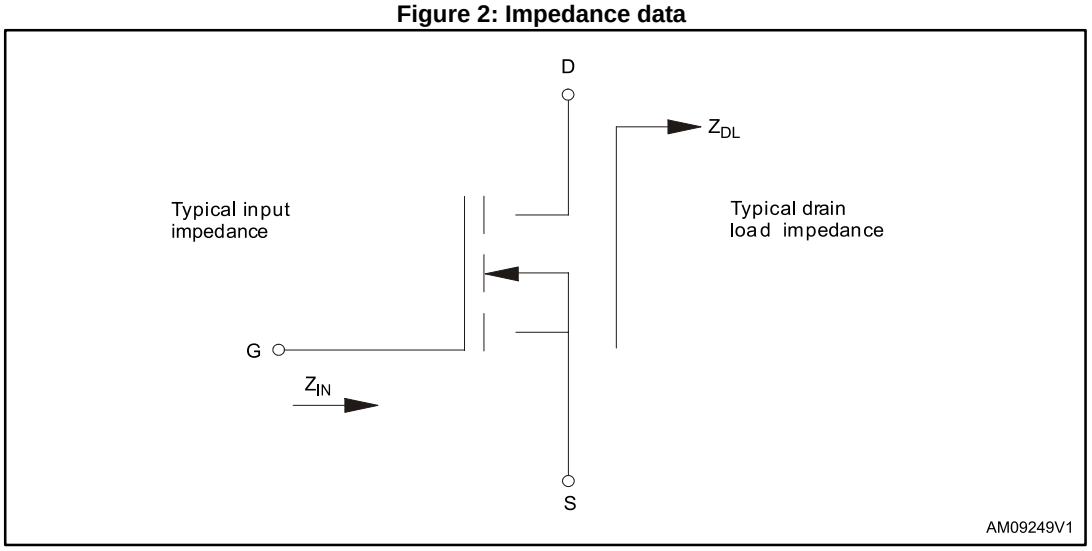


Table 6: Impedance values

Frequency (MHz)	Z_{in}	Z_{dl}
13.56	TBD	TBD

4 Typical performance

Figure 3: Capacitance vs. drain-source voltage

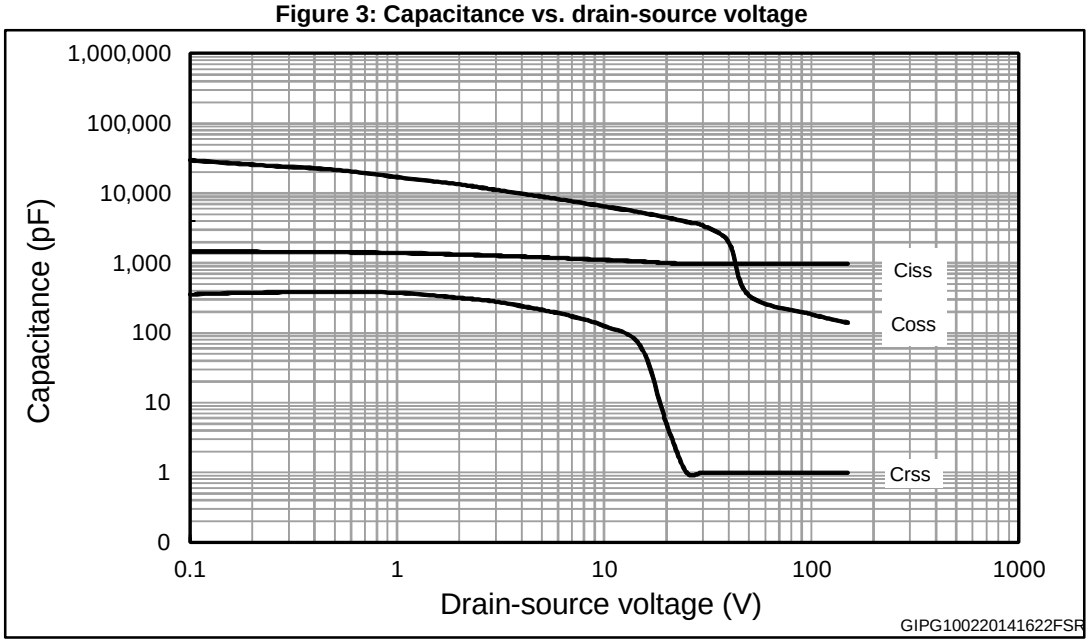


Figure 4: Gain and efficiency vs. output power @ 150 V

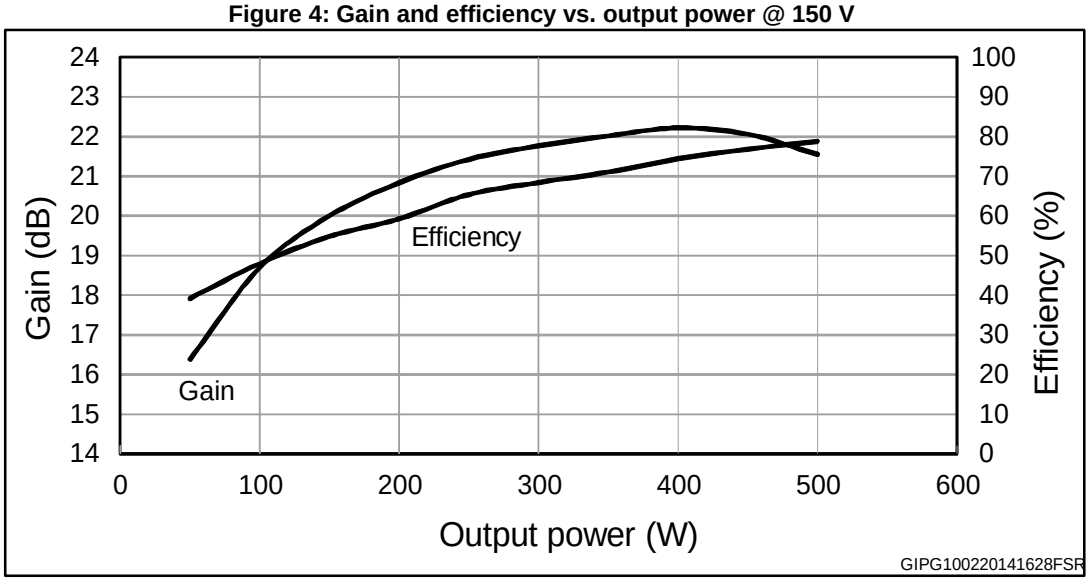
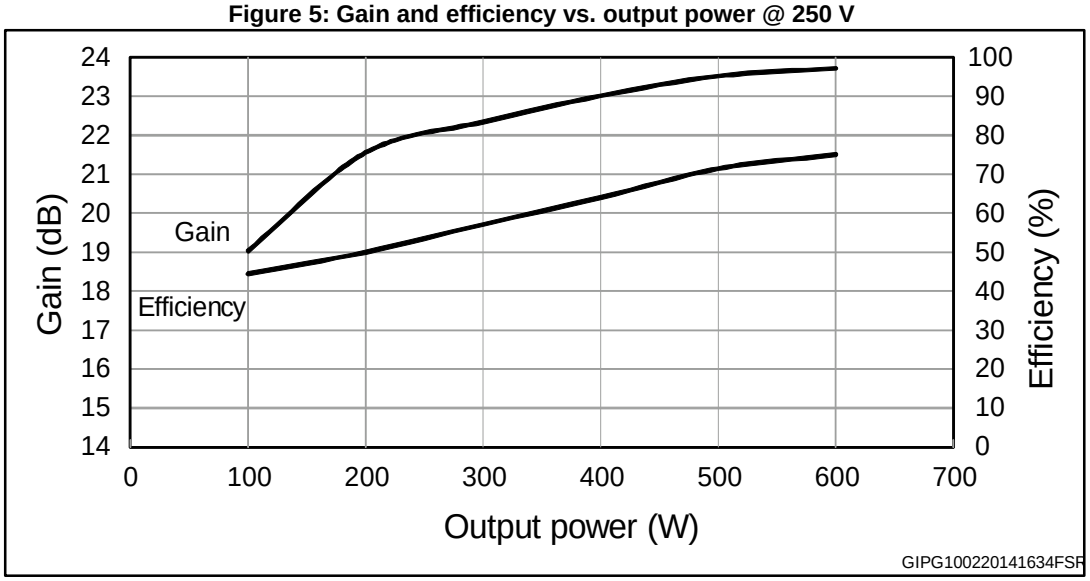


Figure 5: Gain and efficiency vs. output power @ 250 V



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.

5.1 STAC177B mechanical data

Figure 6: STAC177B mechanical drawings

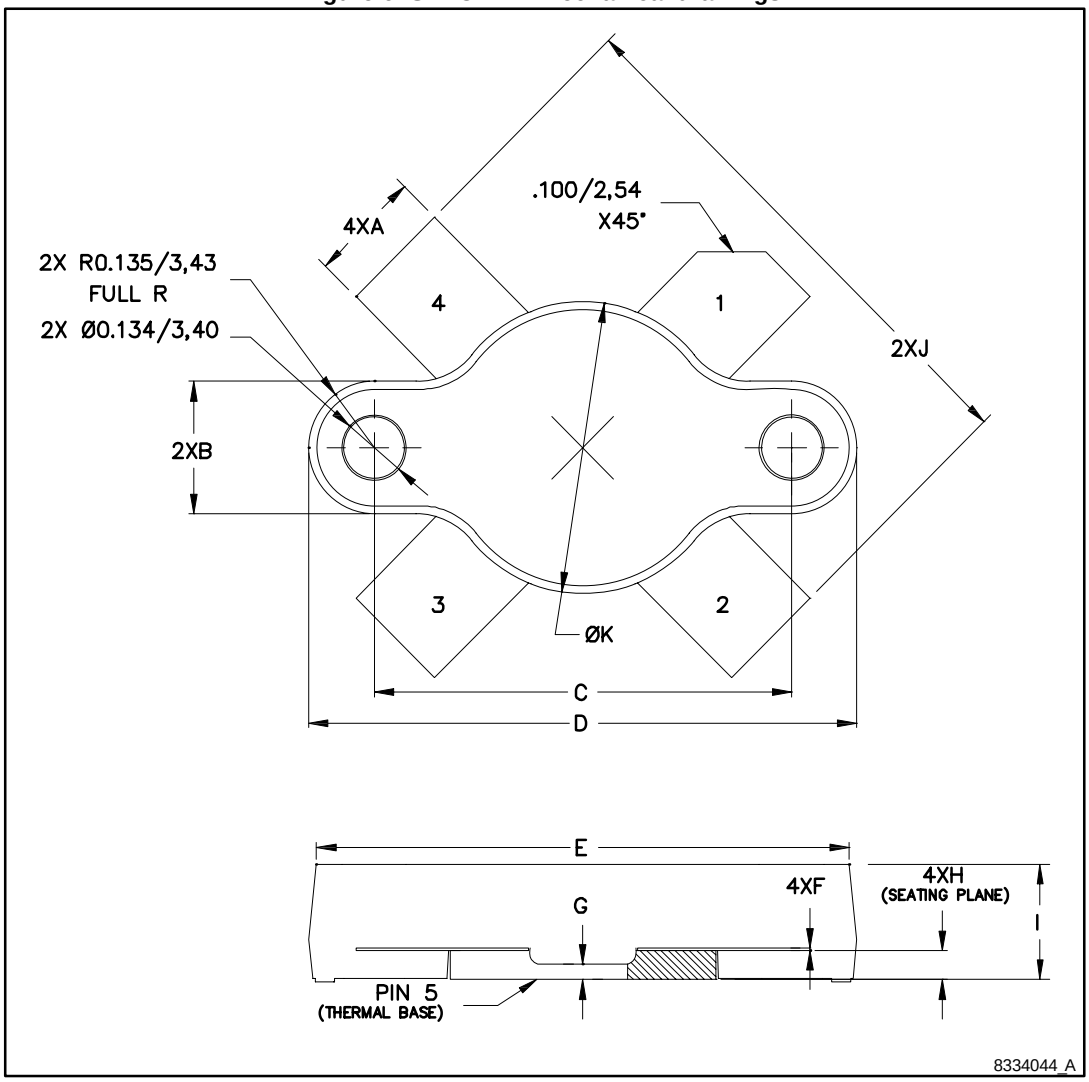


Table 7: STAC177B mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	5.72		5.97
B	6.73		6.99
C	21.84		22.10
D	28.70		28.96
E		28.02	
F	0.10		0.15
G		0.81	
H	1.45		1.70
I	5.79		6.15
J	27.43		28.45
K	15.01		15.27

6 Marking, packing and shipping specifications

Table 8: Packing and shipping specifications

Order code	Packaging	Pieces per tray	Dry pack humidity	Lot code
STAC250V2-500E	Plastic tray	25	< 10%	Not mixed

Figure 7: Marking layout

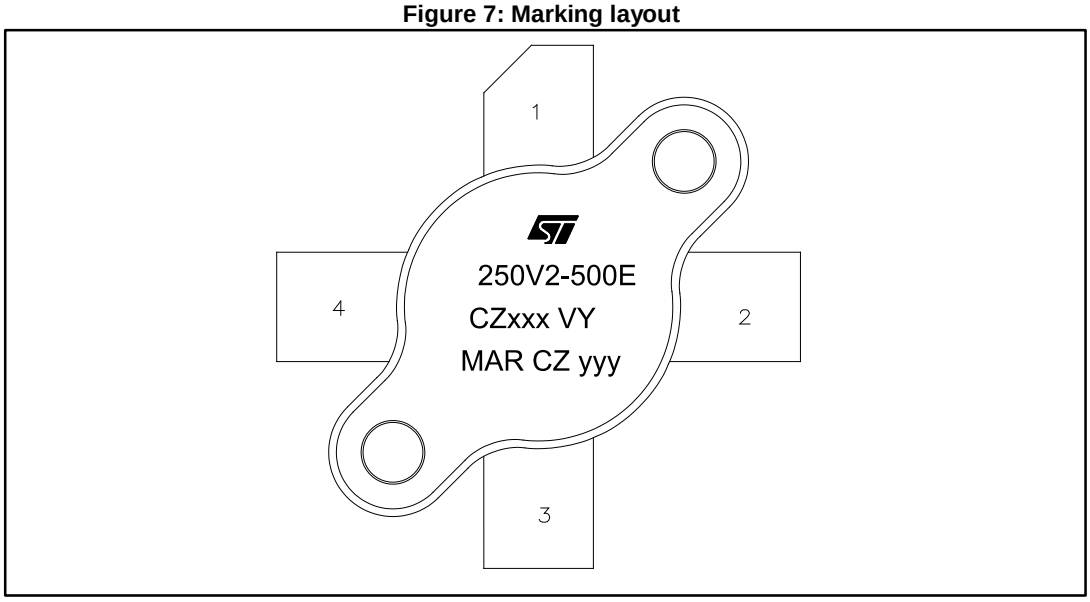


Table 9: Marking specifications

Symbol	Description
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 Revision history

Table 10: Document revision history

Date	Revision	Changes
14-Mar-2014	1	Initial release.
04-Aug-2014	2	Modified title in cover page. Updated *Table 4: "Static"* Minor text change
15-Sep-2014	3	Document status promoted from preliminary to production data.

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