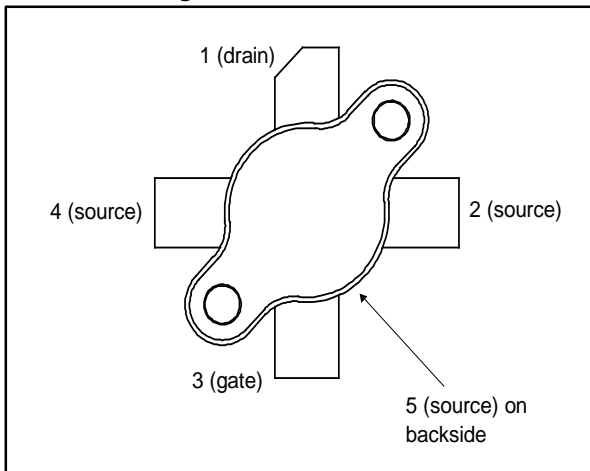


Figure 1: Pin connection



Features

- Operating frequency up to 27 MHz
- $P_{OUT} = 600$ W typ. with 23 dB gain @ 13.56 MHz/250 V
- Designed for Class-AB, C, D and E operation
- $V_{(BR)DSS} > 1000$ V
- Housed in STAC® package, using air cavity packaging technology
- In compliance with the 2002/95/EC1 European Directive

Description

The STAC250V2-500E uses the latest RF Power SuperDMOS technology specially designed for 150 V and 250 V industrial RF power Class-AB, 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	Packing
STAC250V2-500E	250V2-500 ⁽¹⁾	STAC177B	Plastic tray

Notes:

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

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1 Electrical data

1.1 Maximum ratings

($T_{CASE} = 25\text{ °C}$)

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	1000	V
V_{GS}	Gate-source voltage	± 20	V
T_J	Max. operating junction temperature	200	$^{\circ}\text{C}$
T_{STG}	Storage temperature	-65 to +150	$^{\circ}\text{C}$

1.2 Thermal data

Table 3: Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction-case thermal resistance	0.14	$^{\circ}\text{C/W}$

2 Electrical characteristics

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

2.1 Static

Table 4: Static

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	$I_D = 250\text{ }\mu\text{A}$	1000			V
I_{DSS}	$V_{GS} = 0\text{ V}; V_{DS} = 750\text{ V}$			1	μA
I_{GSS}	$V_{GS} = 20\text{ V}; V_{DS} = 0\text{ V}$			1	μA
V_{TH}	$I_D = 250\text{ }\mu\text{A}$	3	4.7	6	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}; I_D = 7\text{ A}$		4.2	5	V
G_{FS}	$V_{DS} = 7\text{ V}; I_D = 3.5\text{ A}$		4.4		S
C_{ISS}	$V_{GS} = 0\text{ V}; V_{DS} = 150\text{ V}; f = 1\text{ MHz}$		980		pF
C_{OSS}	$V_{GS} = 0\text{ V}; V_{DS} = 150\text{ V}; f = 1\text{ MHz}$		140		pF
C_{RSS}	$V_{GS} = 0\text{ V}; V_{DS} = 150\text{ V}; f = 1\text{ MHz}$		1		pF

2.2 Dynamic

Frequency = 13.56 MHz Class-C

Table 5: Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	$V_{DD} = 150\text{ V}, P_{IN} = 3\text{ W}$	500	520	-	W
	$V_{DD} = 250\text{ V}, P_{IN} = 2.4\text{ W}$	500	700	-	
Gain	$V_{DD} = 150\text{ V}, P_{IN} = 3\text{ W}$	22	22.3	-	dB
	$V_{DD} = 250\text{ V}, P_{IN} = 2.4\text{ W}$	24	24.6	-	
Efficiency	$V_{DD} = 150\text{ V}, P_{OUT} = 3\text{ W}$	70	73	-	%
	$V_{DD} = 250\text{ V}, P_{OUT} = 2.4\text{ W}$	70	74	-	%
Load mismatch	$V_{DD} = 150\text{ V}, P_{OUT} = 500\text{ W}$		10:1 ⁽¹⁾ 65:1	-	VSWR
	$V_{DD} = 250\text{ V}, P_{OUT} = 500\text{ W}$		6:1 20:1 ⁽¹⁾	-	

Notes:

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

Table 6: Dynamic (frequency = 13.56 MHz Class-AB, I_{DQ} = 25 mA)

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P _{OUT}	V _{DD} = 150 V, P _{IN} = 1 W	500	580	-	W
	V _{DD} = 250 V, P _{IN} = 0.5 W	500	700	-	
Gain	V _{DD} = 150 V, P _{IN} = 1 W	27	27.6	-	dB
	V _{DD} = 250 V, P _{IN} = 0.5 W	30	31	-	
Efficiency	V _{DD} = 150 V, P _{IN} = 1 W	70	73	-	%
	V _{DD} = 250 V, P _{IN} = 0.5	70	75	-	%
Load mismatch	V _{DD} = 150 V, P _{OUT} = 500 W		6:1 ⁽¹⁾ 65:1	-	VSWR
	V _{DD} = 250 V, P _{OUT} = 500 W		5:1 20:1 ⁽¹⁾	-	

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

3 Impedance data

Figure 2: Impedance data

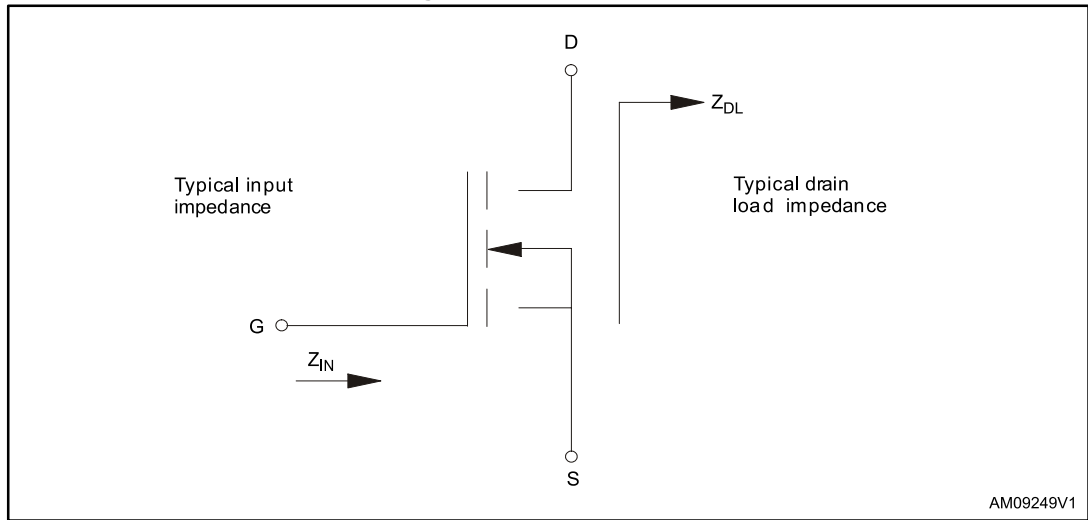


Table 7: Impedance values

Frequency (MHz)	Z_{in}	Z_{dl} (150 V)	Z_{dl} (180 V)	Z_{dl} (250 V)
13.56	$4.6 + j 3.2$	$36 + j 18$	$39 + j 22$	$44 + j 56$

4 Typical performance

Figure 3: Capacitance vs. drain-source voltage

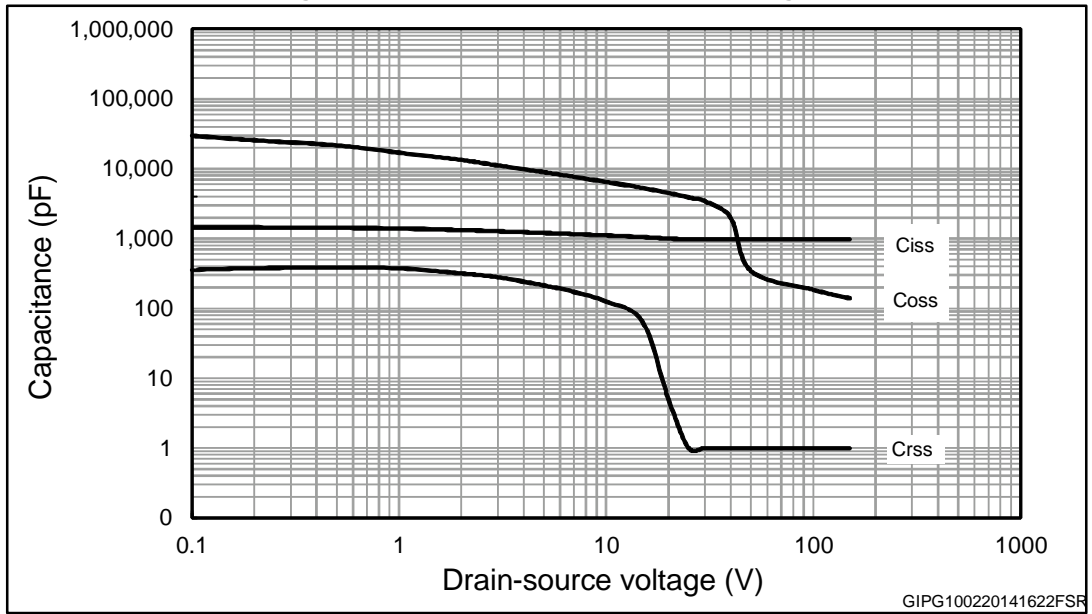


Figure 4: Gain and efficiency vs. output power @ 150 V (frequency = 13.56 MHz Class-C)

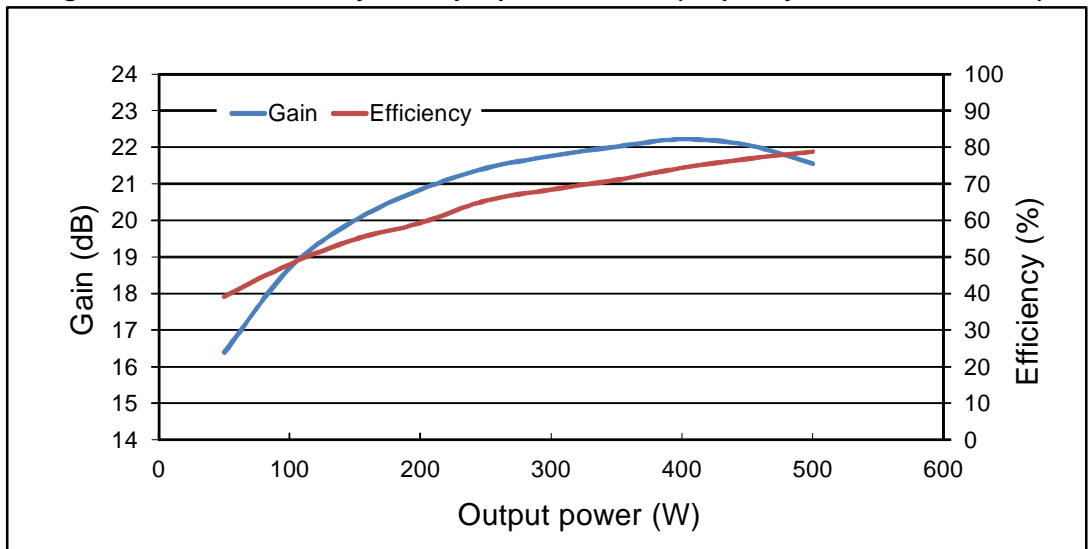
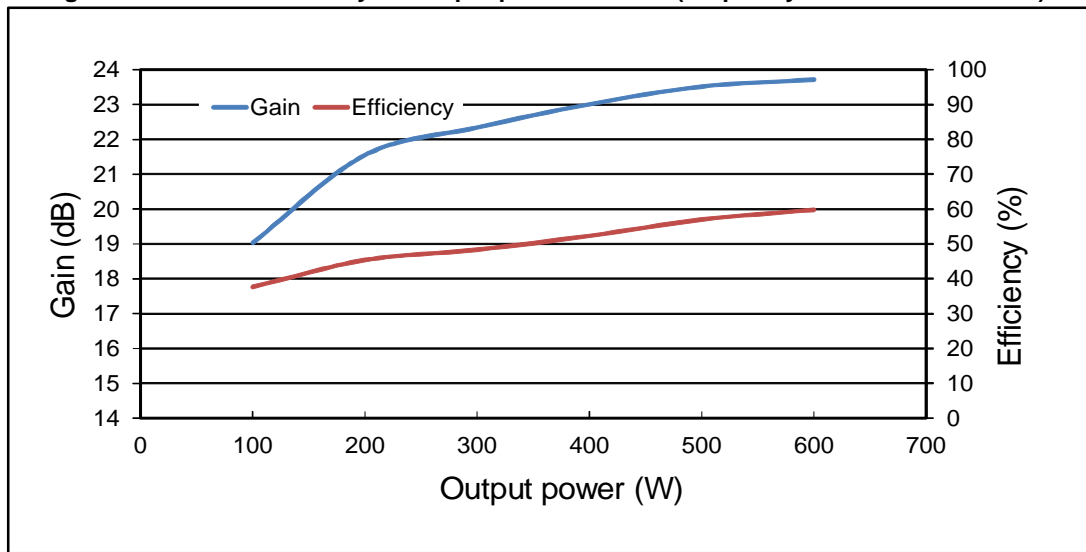


Figure 5: Gain and efficiency vs. output power @ 250 V (frequency = 13.56 MHz Class-C)



5 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.

5.1 STAC177B package information

Figure 6: STAC177B package outline

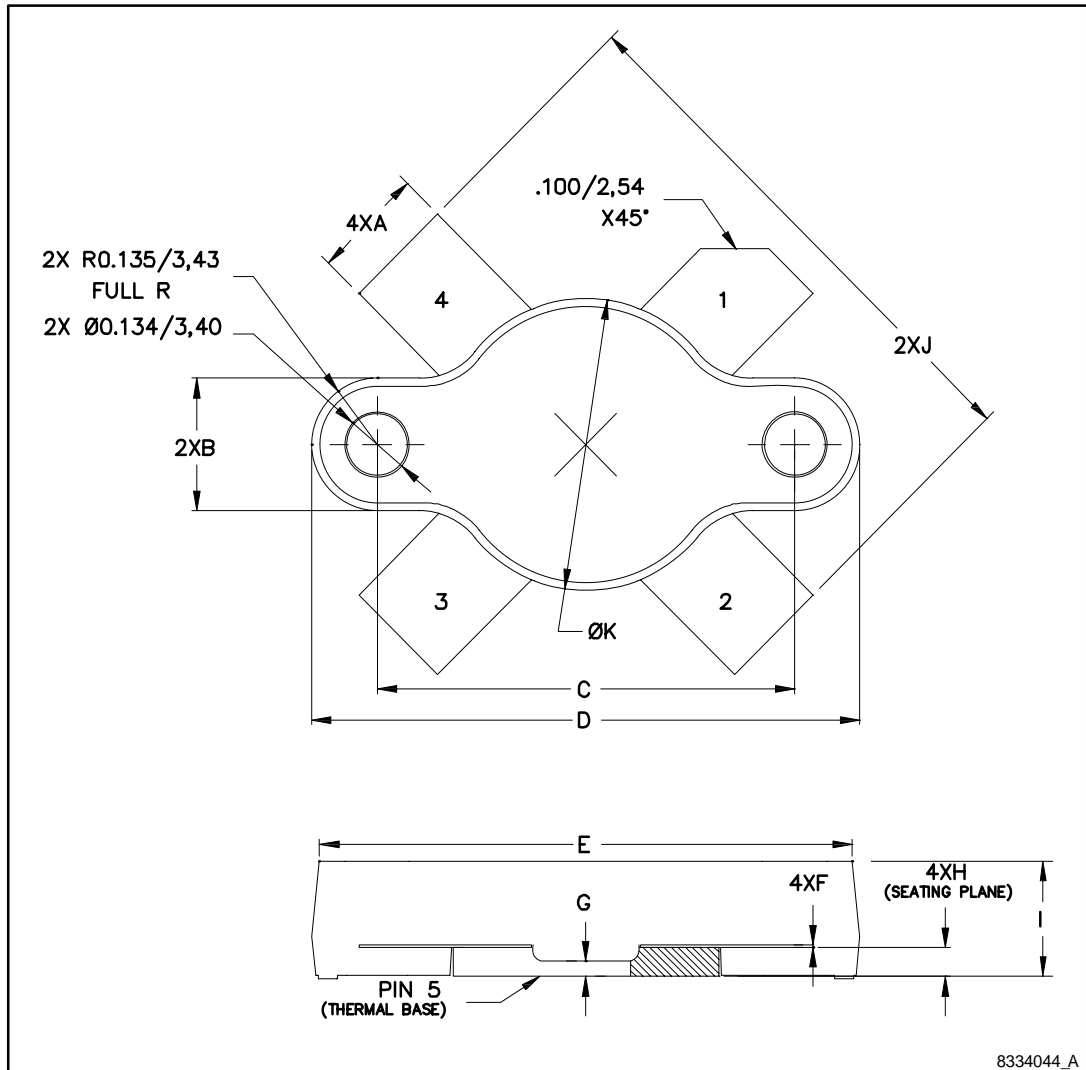


Table 8: STAC177B package mechanical data

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 9: 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

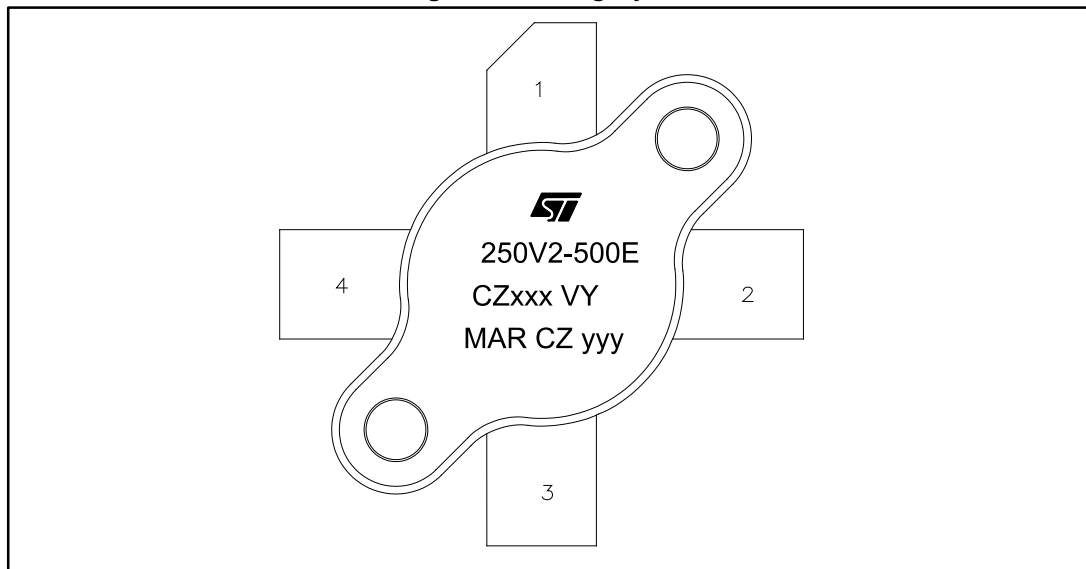


Table 10: Marking specifications

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 11: Document revision history

Date	Revision	Changes
14-Mar-2014	1	Initial release.
04-Aug-2014	2	Modified title in cover page. Updated static table. Minor text change
15-Sep-2014	3	Document status promoted from preliminary to production data.
10-Nov-2014	4	Updated title and features in cover page.
07-Oct-2015	5	Updated features and description in cover page. Updated electrical data section. Updated the dynamic table, the table of impedance values and $V_{(BR)DSS}$ parameter in the static table. Changed figures of the typical performance section. Updated package information section.

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