

## RF power transistor: HF/VHF/UHF RF power N-channel MOSFET

Datasheet – production data

### Features

- Operating frequencies up to 40.68 MHz
- Excellent thermal stability
- $P_{OUT} = 350\text{ W}$  with 17 dB gain @ 40.68 MHz/150 V
- Designed for class E operation
- $V_{(BR)DSS} > 700\text{ V}$
- STAC air cavity packaging technology - STAC<sup>®</sup> package
- In compliance with the 2002/95/EC1 European directive

### Description

The STAC150V2-350E is a high voltage N-channel MOS field-effect RF power transistor especially designed for 150V Industrial RF power class E generators such as PECVD plasma sputtering, flat panel and solar cells manufacturing equipments. STAC150V2-350E benefits from the latest generation of STAC<sup>®</sup> air cavity package which exhibits a 25% lower thermal resistance compared to equivalent ceramic package.

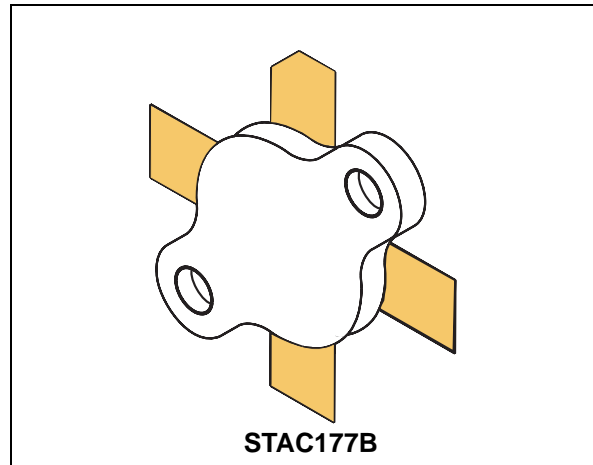


Figure 1. Pin connection

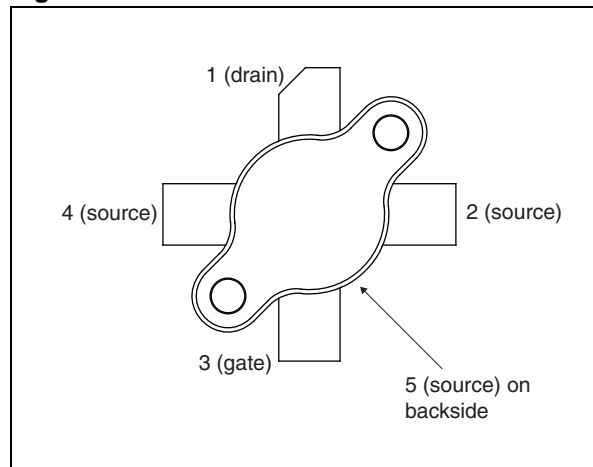


Table 1. Device summary

Order code	Marking	Base qty.	Package	Packaging
STAC150V2-350E	150V2-350 <sup>(1)</sup>	25 pcs	STAC177B	Plastic tray

1. For more details please refer to [Chapter 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	700	V
$V_{GS}$	Gate-source voltage	$\pm 20$	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	TBD	$^{\circ}\text{C}/\text{W}$

## 2 Electrical characteristics

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

### 2.1 Static

**Table 4. Static**

Symbol	Test conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	$I_{DS} = 250\text{ }\mu\text{A}$	700			V
$I_{DSS}$	$V_{GS} = 0\text{ V}$ $V_{DS} = 150\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	$V_{GS} = 20\text{ V}$ $V_{DS} = 0\text{ V}$			0.4	$\mu\text{A}$
$V_{TH}$	$I_D = 250\text{ }\mu\text{A}$	3		6.5	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$ $I_D = 7.5\text{ A}$			10	V
$G_{FS}$	$V_{DS} = \text{TBD V}$ $I_D = \text{TBD A}$		TBD		S
$C_{ISS}$	$V_{GS} = 0\text{ V}$ $V_{DS} = 150\text{ V}$ $f = 1\text{ MHz}$		1300		pF
$C_{OSS}$	$V_{GS} = 0\text{ V}$ $V_{DS} = 150\text{ V}$ $f = 1\text{ MHz}$		115		pF
$C_{RSS}$	$V_{GS} = 0\text{ V}$ $V_{DS} = 150\text{ V}$ $f = 1\text{ MHz}$		15		pF

### 2.2 Dynamic

**Table 5. Dynamic (pulse test: 1ms - 10%)**

Symbol	Test conditions	Min	Typ	Max	Unit
$P_{OUT}$	$V_{DD} = 150\text{ V}$ , $P_{IN} = 12\text{ W}$ , $f = 40.68\text{ MHz}$	350	500	-	W
Gain	$V_{DD} = 150\text{ V}$ , $P_{IN} = 12\text{ W}$ , $f = 40.68\text{ MHz}$		16.5	-	dB
Efficiency	$V_{DD} = 150\text{ V}$ , $P_{OUT} = 500\text{ W}$ , $f = 40.68\text{ MHz}$	60	70	-	%
Load mismatch	$V_{DD} = 150\text{ V}$ , $P_{OUT} = 500\text{ W}$ , $f = 40.68\text{ MHz}$		65:1	-	VSWR

### 3 Impedance data

Figure 2. Impedance data

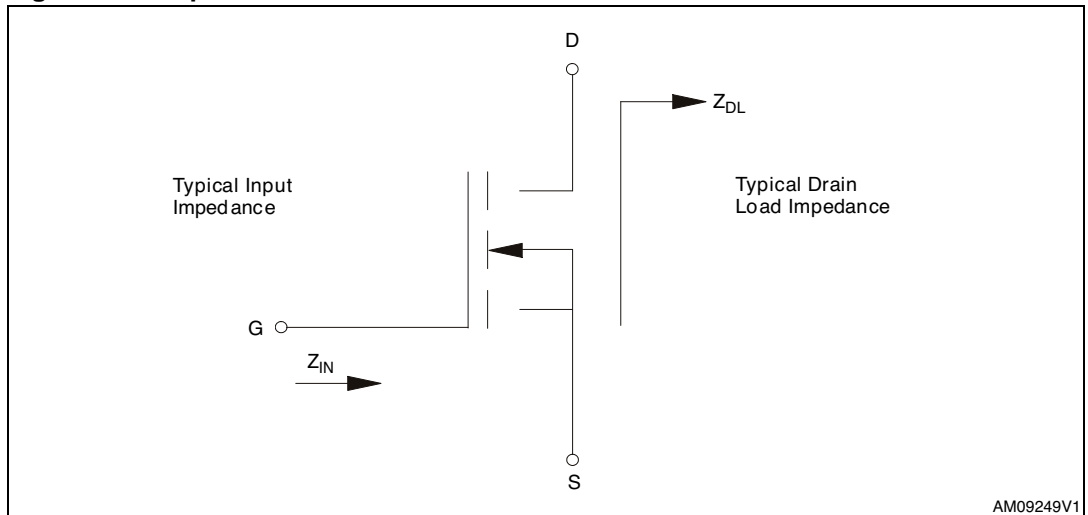
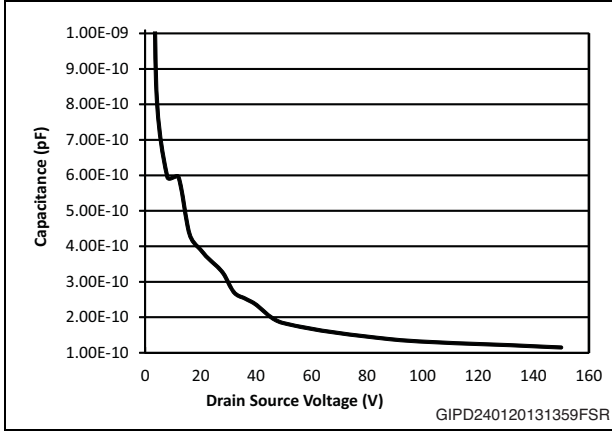


Table 6. Impedance values

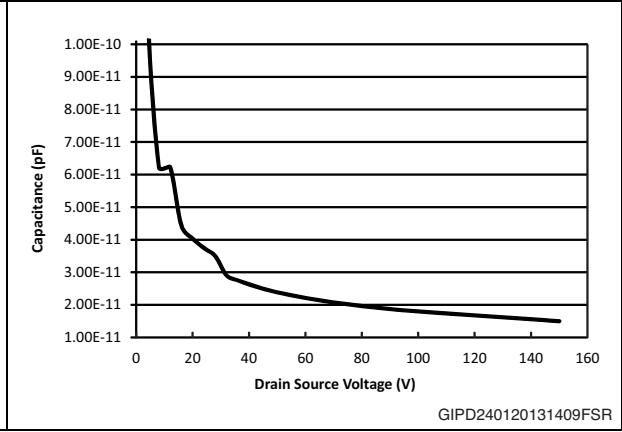
Frequency (MHz)	$Z_{in}$	$Z_{dl}$
13.56	TBD	TBD
27.12	TBD	TBD
40.68	$0.6 - j1.5$	$11 + j13$

# 4 Typical performance

**Figure 3.  $C_{OSS}$  capacitance vs. drain-source voltage**



**Figure 4.  $C_{RSS}$  capacitance vs. drain-source voltage**



**Figure 5.  $C_{ISS}$  capacitance vs. drain-source voltage**

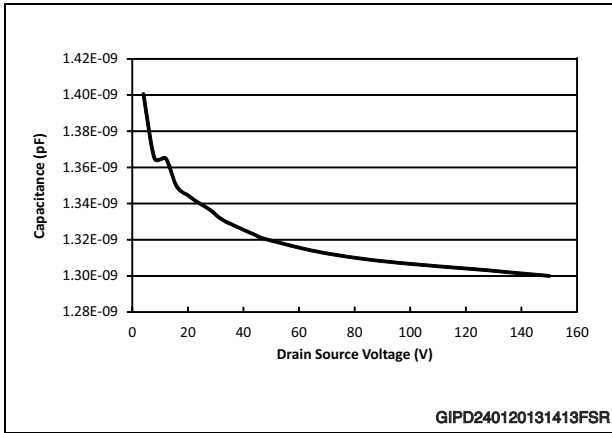
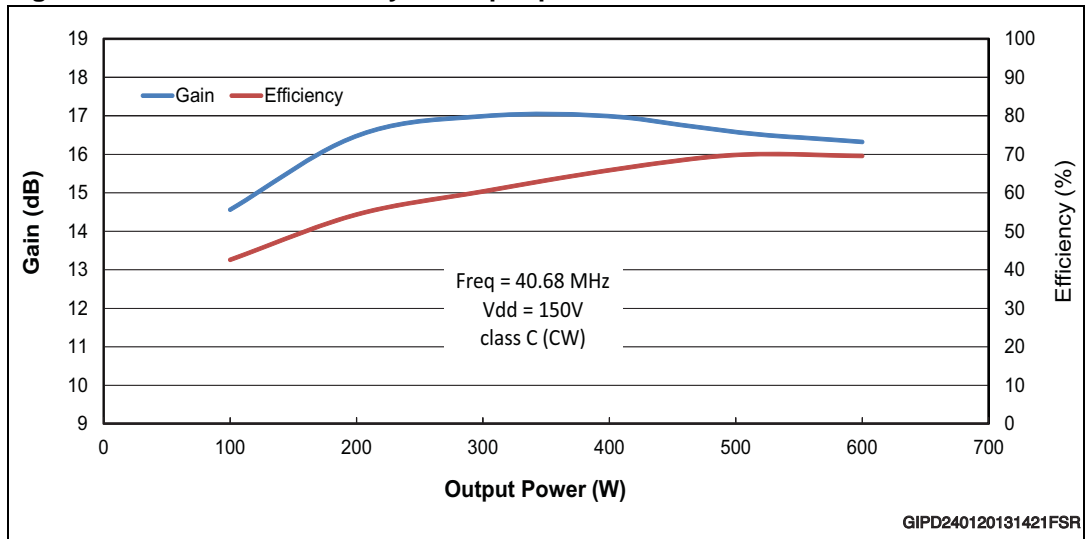


Figure 6. Gain and efficiency vs output power



## 5 Package mechanical data

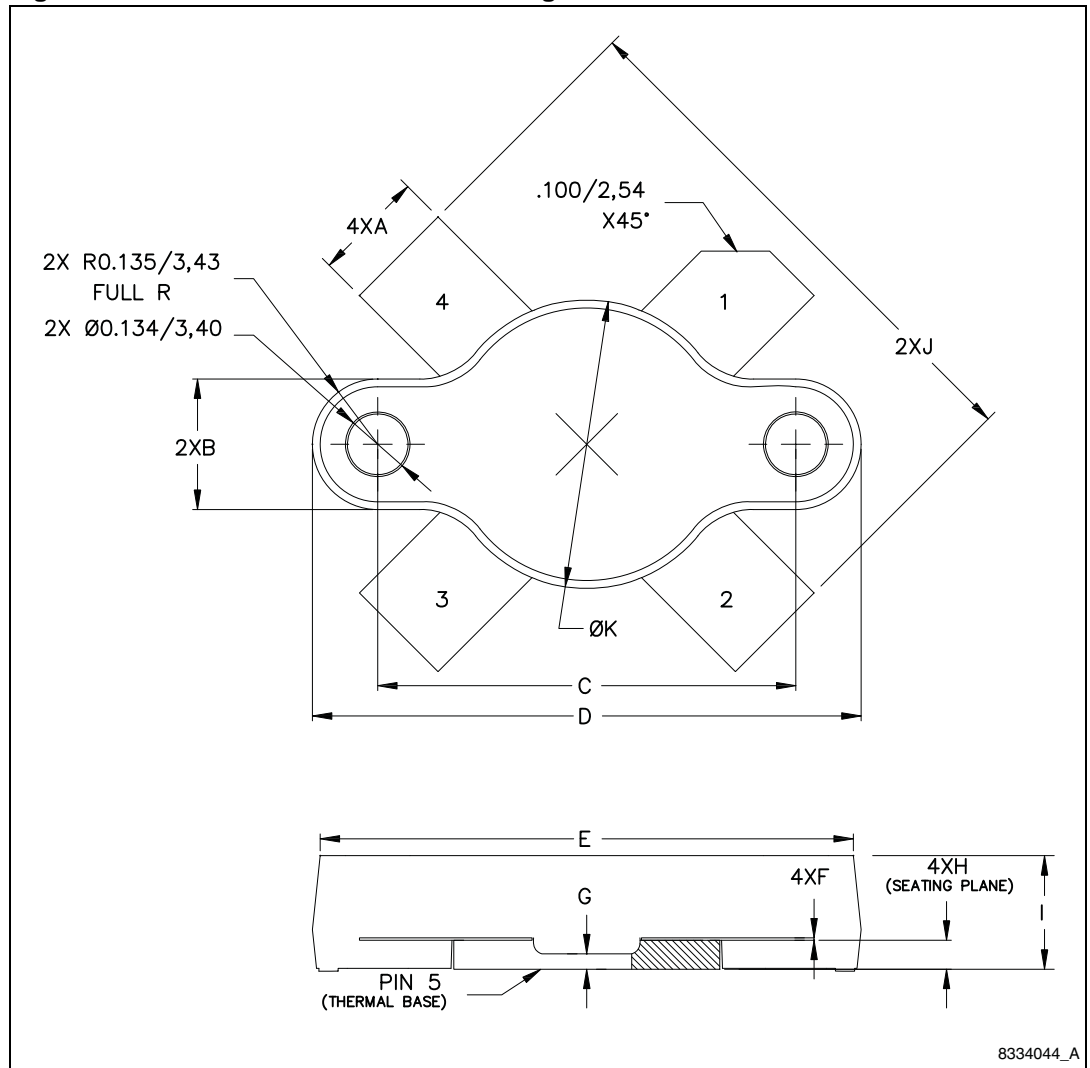
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK is an ST trademark.

**Table 7. 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

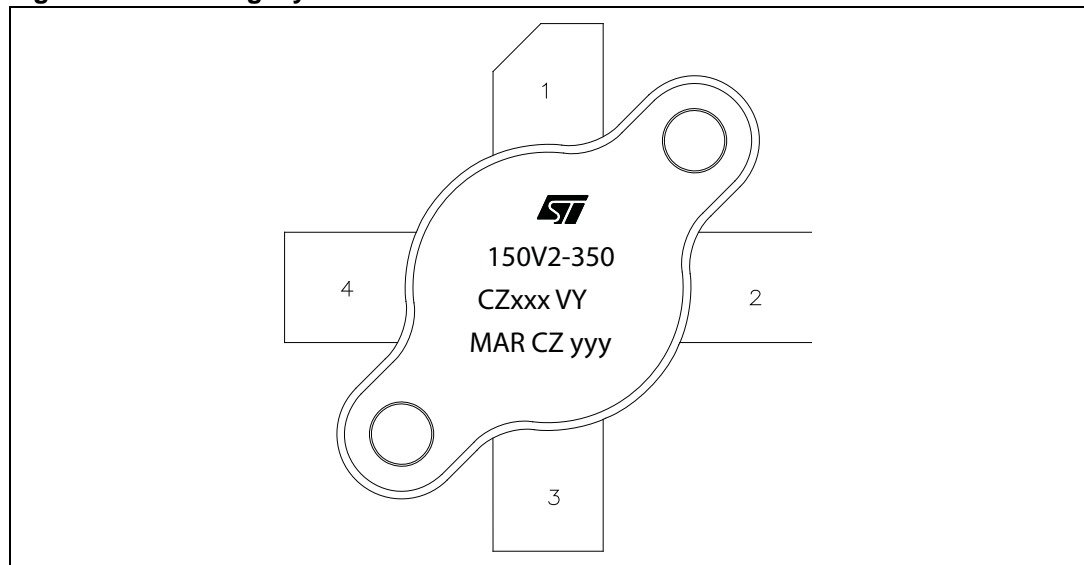


## 6 Marking, packing and shipping specifications

**Table 8. Packing and shipping specifications**

Order code	Packaging	Pcs per tray	Dry pack humidity	Lot code
STAC150V2-350E	Plastic tray	25	< 10 %	Not mixed

**Figure 8. 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
24-Jan-2013	1	Initial release.

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