

# STAC2942F

### HF/VHF/UHF RF power N-channel MOSFETs

### Features

- Gold metallization
- Excellent thermal stability
- Common source push-pull configuration
- P<sub>OUT</sub> = 350 W min. with 21 dB gain @ 175 MHz
- In compliance with the 2002/95/EC European directive

### Description

The STAC2942F is a gold metallized N-channel MOS field-effect RF power transistor. It is intended for use in 50 V DC large signal applications up to 250 MHz.

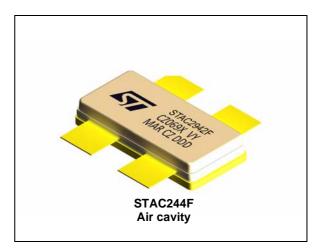
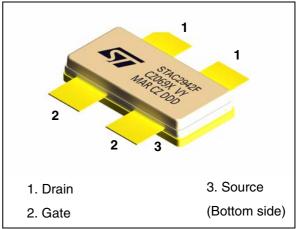


Figure 1. Pin connection



#### Table 1. Device summary

Order code	Marking	Package	Packaging
STAC2942FW	STAC2942F <sup>(1)</sup>	STAC244F	Plastic tray

1. For more details please refer to Chapter 7: Marking, packing and shipping specifications.

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# 1 Electrical data

### 1.1 Maximum ratings

Symbol	Parameter	Value	Unit
V <sub>(BR)DSS</sub> <sup>(1)</sup>	Drain source voltage	130	V
V <sub>DGR</sub> <sup>(1)</sup>	Drain-gate voltage ( $R_{GS} = 1 M\Omega$ )	130	V
V <sub>GS</sub>	Gate-source voltage	±20	V
I <sub>D</sub>	Drain current	40	Α
P <sub>DISS</sub>	Power dissipation	625	W
Τ <sub>J</sub>	Max. operating junction temperature	200	°C
T <sub>STG</sub>	Storage temperature	-65 to +150	°C

Table 2	Abaaluta	movimum	rotingo	(T _ 25 °C)
Table 2.	Absolute	maximum	raungs	$(T_{CASF} = 25 °C)$

1.  $T_J = 150 \ ^{\circ}C$ 

### 1.2 Thermal data

#### Table 3.Thermal data

Symbol	Parameter	Value	Unit
R <sub>thJC</sub>	Junction - case thermal resistance	0.28	°C/W



# 2 Electrical characteristics

 $(T_{CASE} = 25 \text{ °C})$ 

### 2.1 Static

Table 4.	Static (per side)						
Symbol		Test conditions		Min.	Тур.	Max.	Unit
V <sub>(BR)DSS</sub> <sup>(1)</sup>	$V_{GS} = 0 V$	I <sub>DS</sub> = 100 mA		130			V
I <sub>DSS</sub>	$V_{GS} = 0 V$	$V_{DS} = 50 V$				100	μA
I <sub>GSS</sub>	$V_{GS} = 20 V$	$V_{DS} = 0 V$				250	nA
V <sub>GS(Q)</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 250 mA		1.5	2.5	4.0	V
V <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 10 A				3.0	V
G <sub>FS</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 5 A		5			S
C <sub>ISS</sub>					425		pF
C <sub>OSS</sub>	$V_{GS} = 0 V$	$V_{DS} = 50 V$	f = 1 MHz		202		pF
C <sub>RSS</sub>					12		pF
C <sub>RSS</sub>					12		

1. T<sub>J</sub> = 150 °C

### 2.2 Dynamic

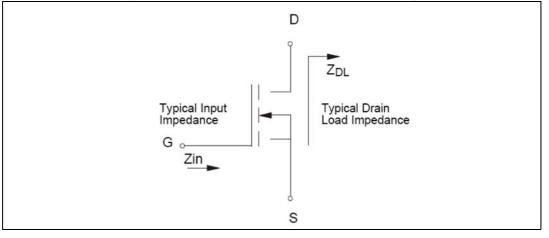
Table	5.	Dynam	ic
TUDIC	<b>u</b> .	bynan	

Symbol	Test conditions	Min.	Тур.	Max.	Unit
P <sub>OUT</sub>	V <sub>DD</sub> = 50 V, I <sub>DQ</sub> = 2 x 250 mA, P <sub>IN</sub> = 4 W, f = 175 MHz	350	450		W
h <sub>D</sub>	$V_{DD} = 50 \text{ V}, \text{ I}_{DQ} = 2 \text{ x } 250 \text{ mA}, \text{ P}_{IN} = 4 \text{ W}, \text{ f} = 175 \text{ MHz}$	60	75		%



## 3 Impedance

#### Figure 2. Current conventions



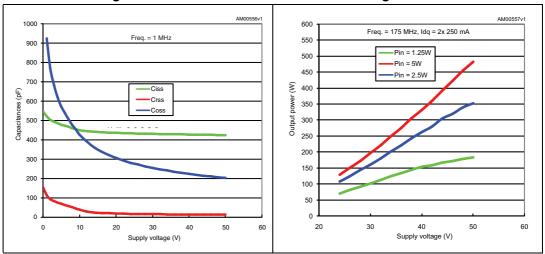
#### Table 6.Impedance data

Freq. (MHz)	Z <sub>IN</sub> (Ω)	Z <sub>DL</sub> (Ω)
175 MHz	2.0 - j2.0	3.5 + j5.2

Note: Measured gate to gate and drain to drain, respectively.

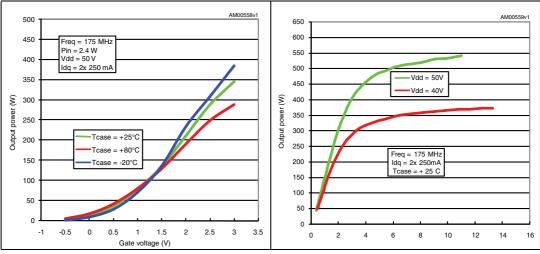


### 4 Typical performance



# Figure 3. Capacitances vs drain supply Figure 4. Output power vs drain supply voltage







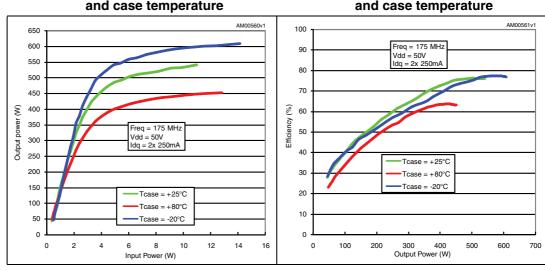
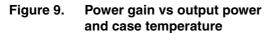
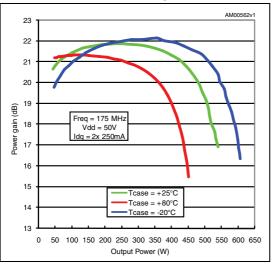


Figure 7. Output power vs input power Figure 8. and case temperature









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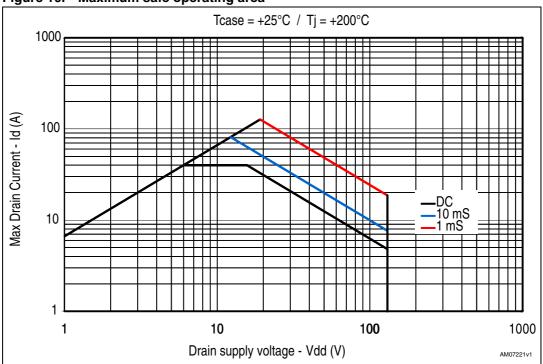
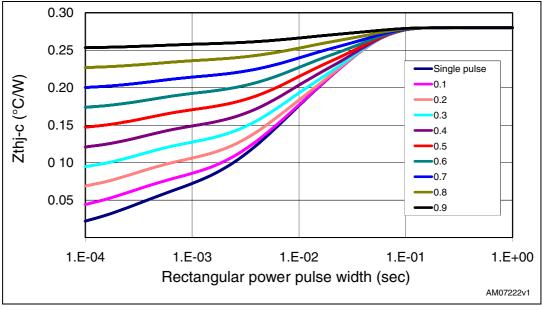


Figure 10. Maximum safe operating area





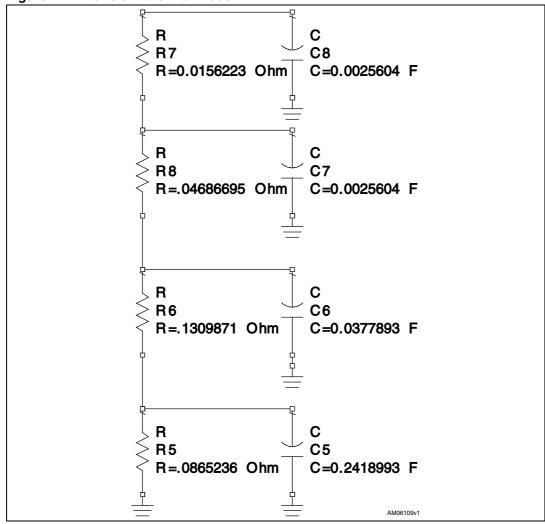
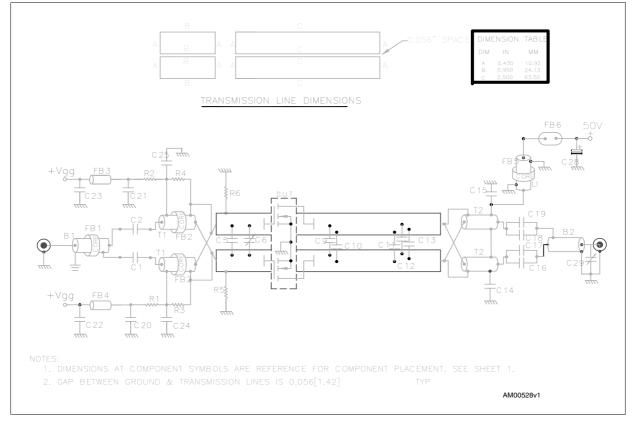


Figure 12. Transient thermal model



# 5 Test circuit



#### Figure 13. 175 MHz test circuit schematic (production test circuit)

Table 7.	175 MHz test circuit component part list
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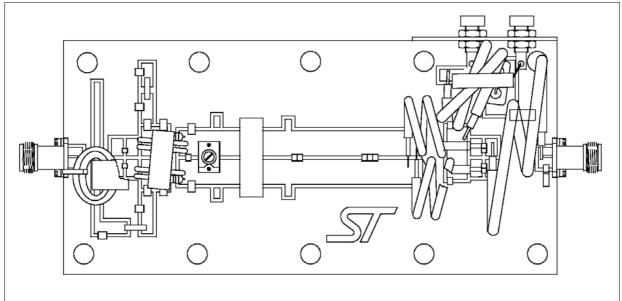
Component	Description	
C1, C2, C14, C15, C24, C25	1200 pF ATC 700B chip capacitor	
C5	75 pF ATC 100B chip capacitor	
C6	ST406 variable capacitor	
C9, C10	47 pF ATC 100B chip capacitor	
C11, C12, C13	43 pF ATC 100B chip capacitor	
C16, C18	470 pF ATC 100B chip capacitor	
C17, C19, C20, C21	10,000 pF ATC 200B chip capacitor	
C22, C23	0.1 µF 200 V chip capacitor	
C28	10 μF 100 V electrolytic capacitor	
C29	0.8 - 8 pF variable capacitor	
R1, R2, R5, R6	430 Ω 1/2 W chip resistor	



e 7. 175 MHZ test circuit component part list (continued)		
Component	Description	
R3, R4	270 $\Omega$ 1/2 W axial lead resistor	
B1	RG-316 50 $\Omega$ 11.8" thru ferrite toroid	
B2	RG-142 50 Ω 11.8"	
T1	4:1, RG-316 25 $\Omega$ 5.9", 2 turns thru ferrite core	
T2	1:4, 25 $\Omega$ semi-rigid cable, OD .141", 5.9"	
L1	$\lambda/4$ inductor, RG-142 50 $\Omega$ 11.8", 3 turns thru ferrite toroid	
FB1,FB5	Ferrite toroid	
FB2, FB6	Multi-aperture core	
FB3, FB4	Surface mount ferrite bead	
PCB	Rogers ultralam 2000, Er 2.55, .060"	

Table 7.	175 MHz test circuit com	ponent part list	(continued)
		ponone parenoe	(oonanaoa)

#### Figure 14. Circuit layout





### 6 Package mechanical data

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

Dim.	mm.		Inch	
	Min	Мах	Min	Мах
A	5.10	5.59	200	220
A1	4.32	4.83	170	190
В	4.32	5.33	170	210
С	9.65	9.91	380	390
D	19.61	20.02	772	788
E	20.45	20.70	805	815
F	0.08	1.15	.003	.006
G	0.89	1.14	.035	.045
Н	1.45	1.70	.057	.067
I	3.18	4.32	.125	.170
J	9.27	9.53	.365	.375

 Table 8.
 STAC244F package dimensions



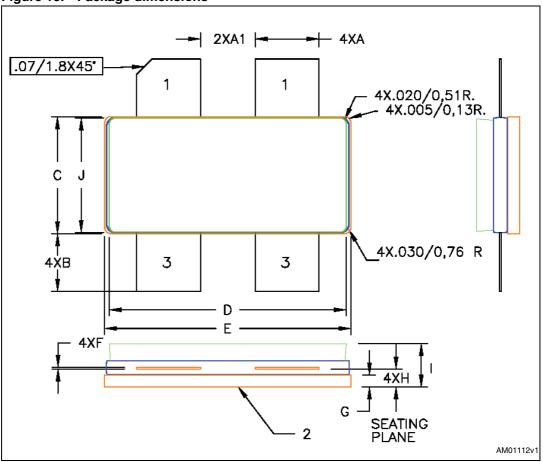


Figure 15. Package dimensions

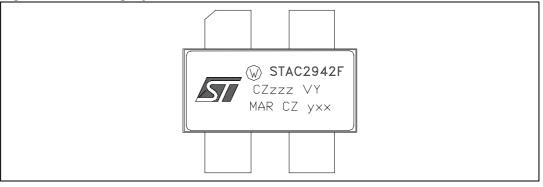


## 7 Marking, packing and shipping specifications

 Table 9.
 Packing and shipping specifications

Order code	Packaging	Pcs per tray	Dry pack humidity	Lot code
STAC2942FW	Tube	20	< 10 %	Not mixed

#### Figure 16. Marking layout



#### Table 10. Marking specifications

Symbol	Description
W	Wafer process code
CZ	Assembly plant
ххх	Last 3 digit of diffusion lot
VY	Diffusion plant
MAR	Country of origin
CZ	Test and finishing plant
У	Assembly year
уу	Assembly week



# 8 Revision history

Table 11.Document revision history

Date	Revision	Changes
12-Feb-2010	1	First release.
16-Apr-2010	2	Added Figure 10, Figure 11 and Figure 12.
25-Oct-2011	3	Added Chapter 7: Marking, packing and shipping specifications.



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