



## STAP85025

RF power transistor, LdmoST plastic family  
N-channel enhancement-mode lateral MOSFETs

### Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 25\text{ W}$  with 15.7 dB gain @ 870 MHz / 13.6 V
- Plastic package
- ESD protection
- In compliance with the 2002/95/EC European directive

### Description

The STAP85025 is a common source N-channel, enhancement-mode lateral field-effect RF power transistor. It is designed for high gain, broadband commercial and industrial applications. It operates at 13.6 V in common source mode at frequencies of up to 1 GHz. STAP85025 boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in STAP ST advanced PowerSO-10RF package. STAP85025's superior linearity performance makes it an ideal solution for car mobile radio.

The STAP ST plastic package was designed to offer high reliability and high power capability. It has been specially optimized for RF needs and offers excellent RF performances and ease of assembly.

Mounting recommendations are available in [www.st.com/rf/](http://www.st.com/rf/) (look for application note AN1294)

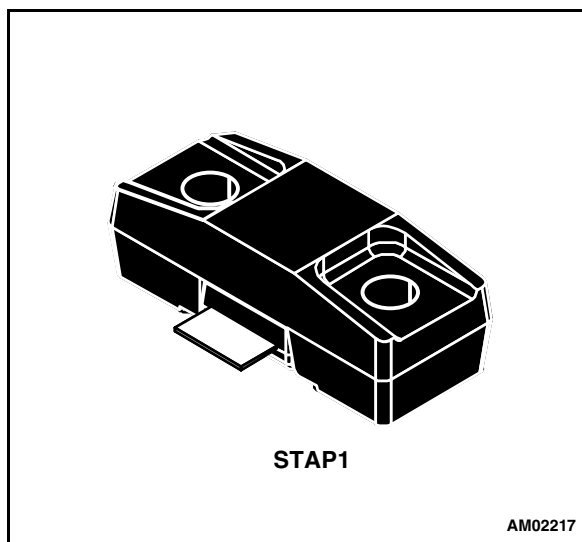


Figure 1. Pin connection

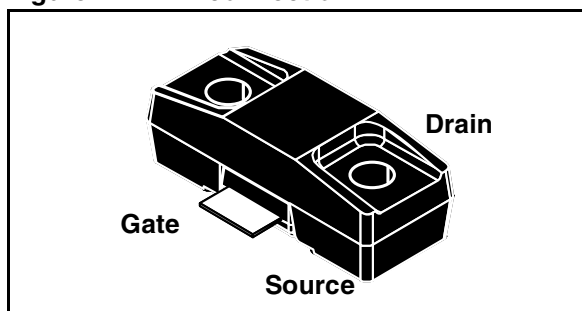


Table 1. Device summary

Order code	Package	Packaging
STAP85025	STAP1	Tube

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# 1 Electrical data

## 1.1 Maximum ratings

Table 2. Absolute maximum ratings ( $T_{CASE} = 25\text{ °C}$ )

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	40	V
$V_{GS}$	Gate-source voltage	-0.5 to +15	V
$I_D$	Drain current	7	A
$P_{DISS}$	Power dissipation (@ $T_C = 70\text{ °C}$ )	79	W
$T_J$	Max. operating junction temperature	165	°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	1.2	°C/W

## 2 Electrical characteristics

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

### 2.1 Static

Table 4. Static

Symbol	Test conditions		Min	Typ	Max	Unit	
$I_{\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 25\text{ V}$	-		1	$\mu\text{A}$	
$I_{\text{GSS}}$	$V_{\text{GS}} = 5\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			1	$\mu\text{A}$	
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 300\text{ mA}$			4.1	V	
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$	$I_{\text{D}} = 1\text{ A}$			0.27	0.31	V
$C_{\text{ISS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 12.5\text{ V}$			55		pF
$C_{\text{OSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 12.5\text{ V}$			40		pF
$C_{\text{RSS}}$	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 12.5\text{ V}$			1.5		pF

### 2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
P3dB	$V_{\text{DD}} = 13.6\text{ V}$ , $I_{\text{DQ}} = 300\text{ mA}$	$f = 870\text{ MHz}$	25	30	-	W
$G_{\text{P}}$	$V_{\text{DD}} = 13.6\text{ V}$ , $I_{\text{DQ}} = 300\text{ mA}$ , $P_{\text{OUT}} = 10\text{ W}$ , $f = 870\text{ MHz}$		15	17.3		dB
$h_{\text{D}}$	$V_{\text{DD}} = 13.6\text{ V}$ , $I_{\text{DQ}} = 300\text{ mA}$ , $P_{\text{OUT}} = \text{P3dB}$ , $f = 870\text{ MHz}$		60	66		%
Load mismatch	$V_{\text{DD}} = 17\text{ V}$ , $I_{\text{DQ}} = 300\text{ mA}$ , $P_{\text{OUT}} = 45\text{ W}$ , $f = 870\text{ MHz}$ All phase angles		20:1			VSWR

### 2.3 ESD protection characteristics

Table 6. ESD protection characteristics

Test conditions	Class
Human body model	2
Machine model	M3

### 2.4 Moisture sensitivity level

Table 7. Moisture sensitivity level

Test conditions	Rating
J-STD-020B	MSL 3

### 3 Impedance

Figure 2. Current conventions

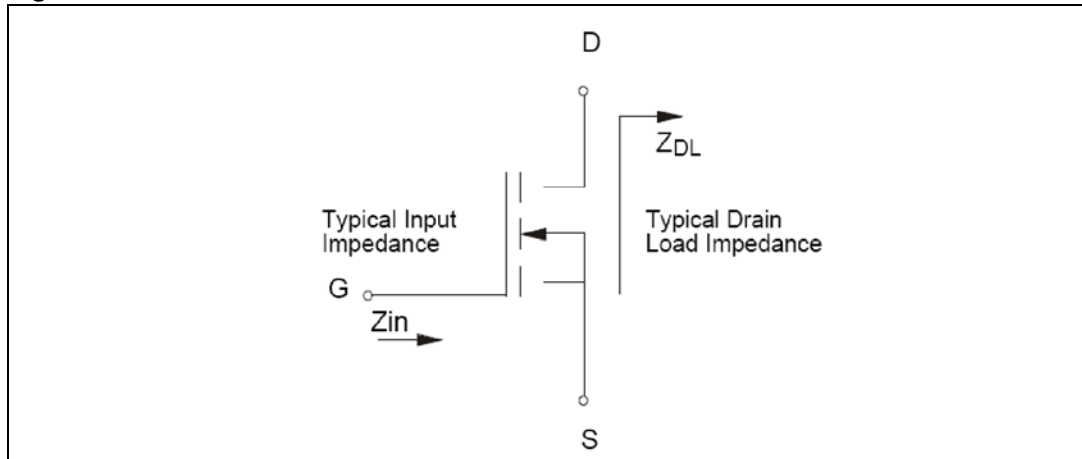


Table 8. Impedance data

Frequency (MHz)	$Z_{IN}$ ( $\Omega$ )	$Z_{DL}$ ( $\Omega$ )
870 MHz	$0.21 + j 1.82$	$1.23 - j 0.98$

## 4 Typical performance

Figure 3. Capacitances vs drain voltage

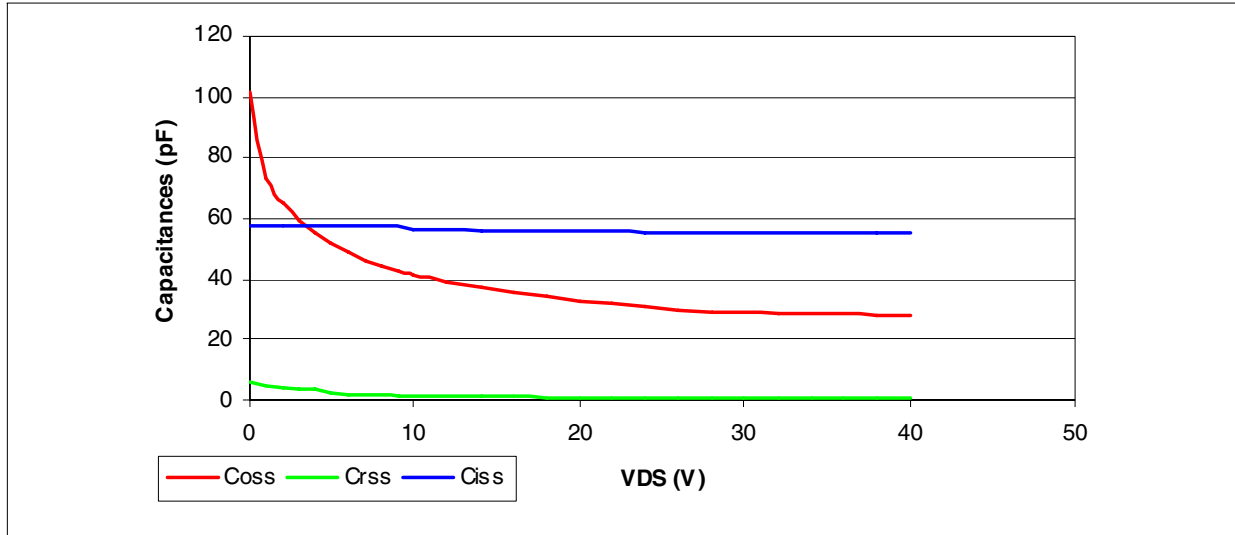


Figure 4. DC output characteristics (T<sub>amb</sub> = -40 °C)

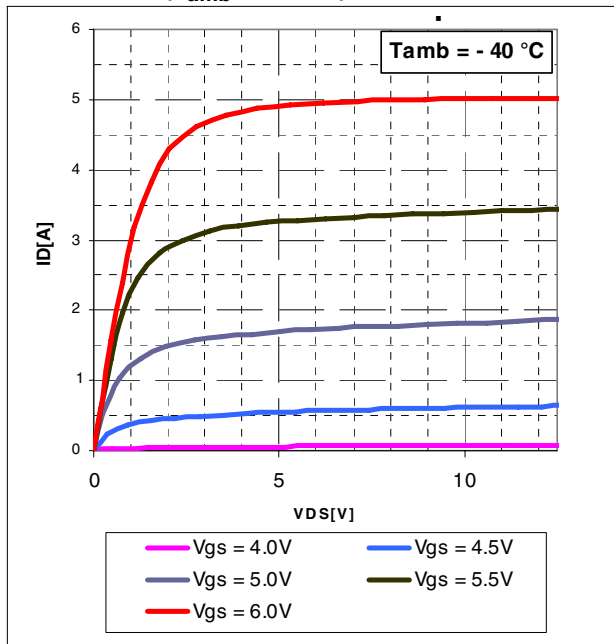
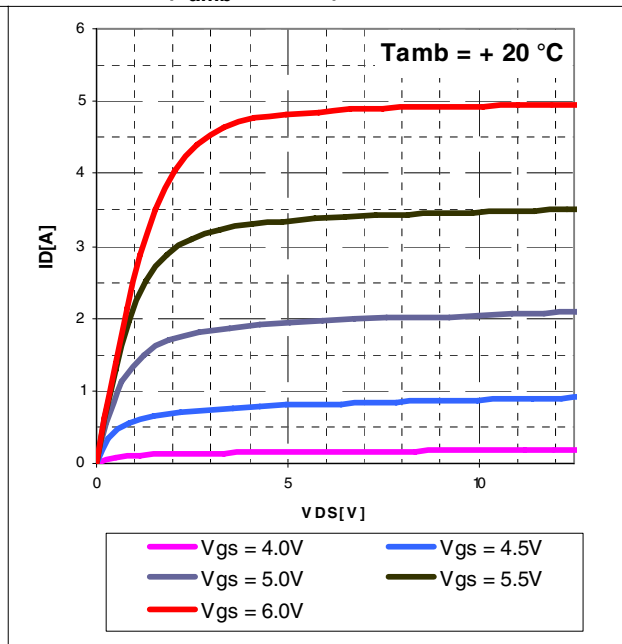
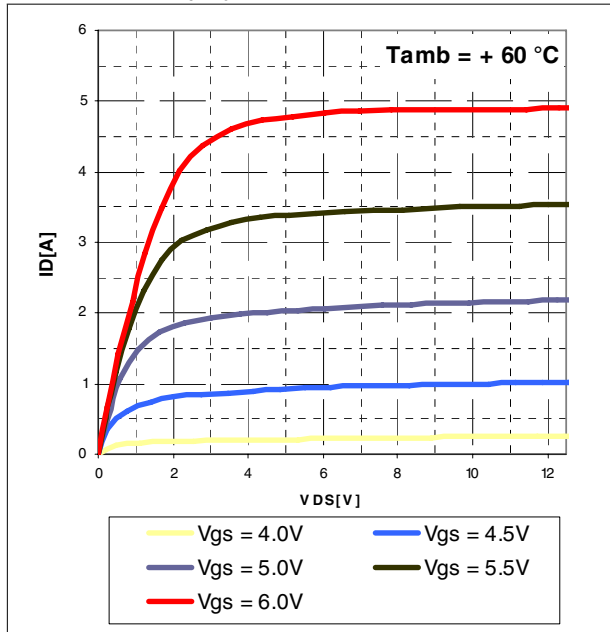


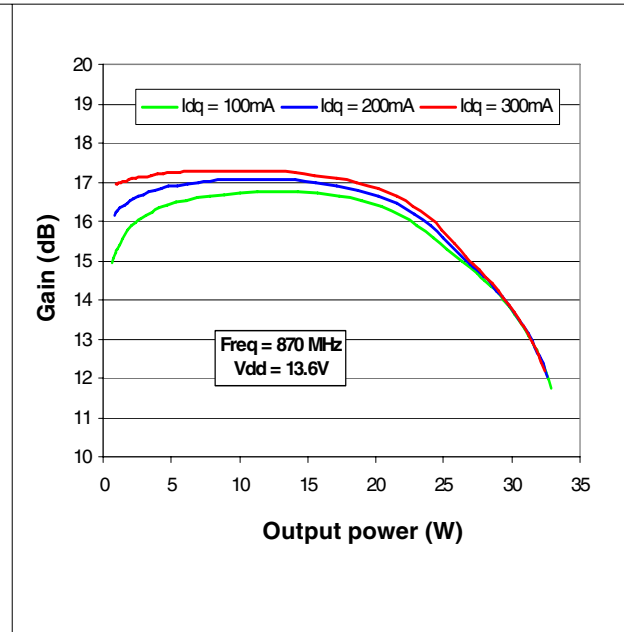
Figure 5. DC output characteristics (T<sub>amb</sub> = +20 °C)



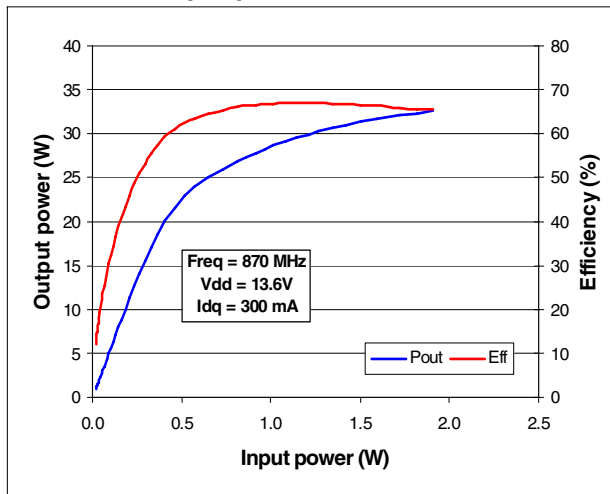
**Figure 6. DC output characteristics**  
 ( $T_{amb} = 60\text{ }^{\circ}\text{C}$ )



**Figure 7. Gain vs output power and Bias current**



**Figure 8. Output power and efficiency vs input power**



**Figure 9. Output power and drain current vs gate voltage**

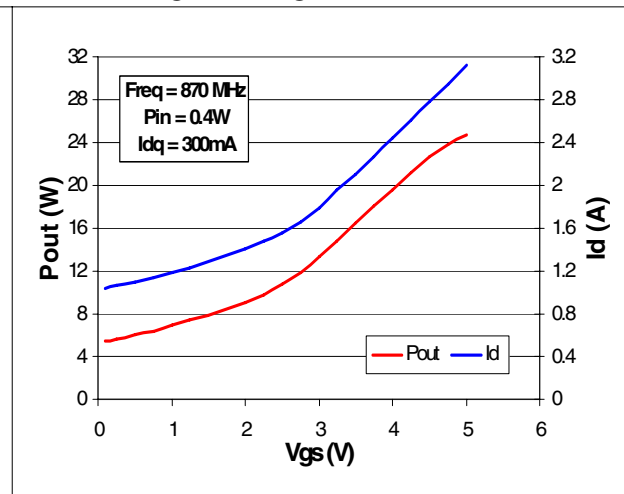


Figure 10. Pout and drain current vs supply voltage ( $P_{in} = 0.4\text{ W}$ )

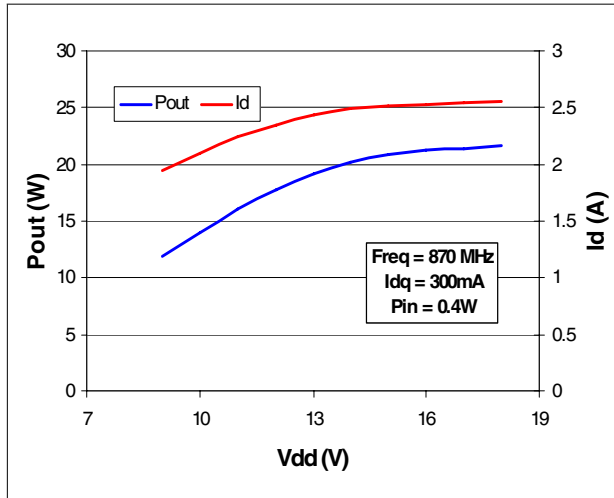
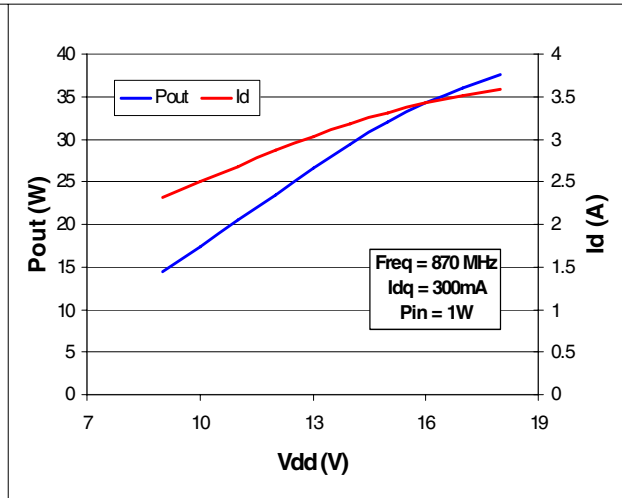


Figure 11. Pout and drain current vs supply voltage ( $P_{in} = 1\text{ W}$ )





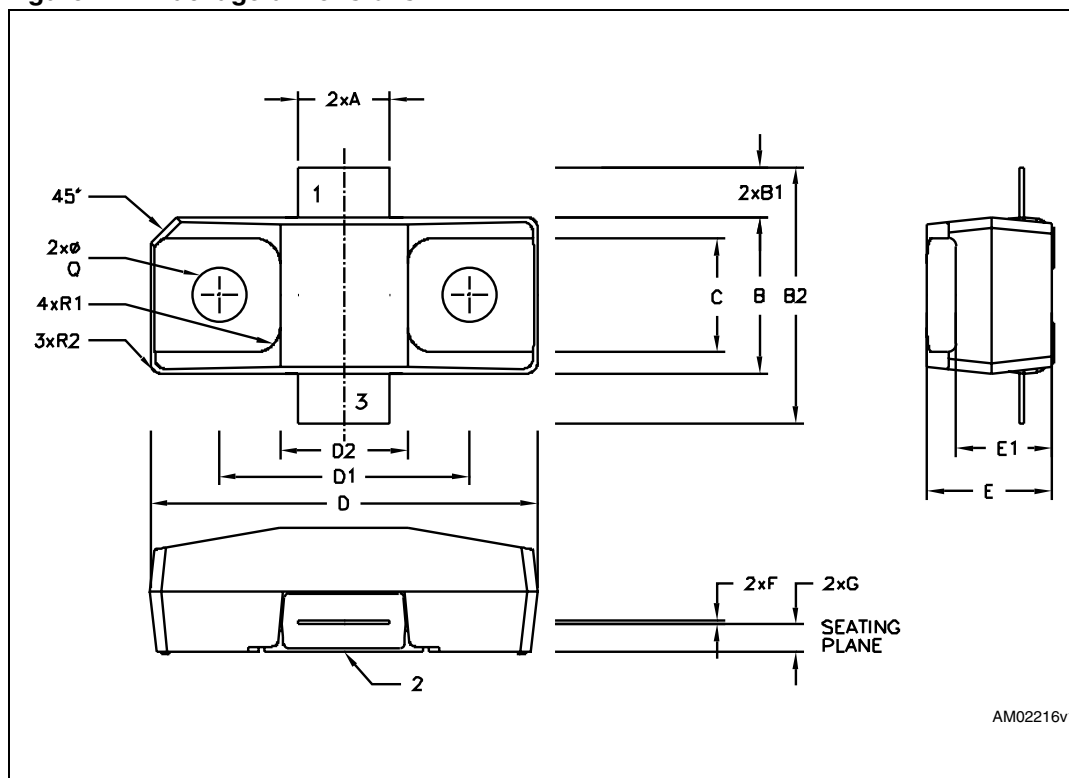
## 5 ECOPACK®

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 9. STAP1 mechanical data

Dim.	mm.		Inch	
	Min	Max	Min	Max
A	5.40	5.65	0.212	0.222
B	9.27	9.53	0.365	0.375
B1	2.90	3.10	0.114	0.122
B2	15.10	15.65	0.594	0.616
C	6.60	6.99	0.260	0.275
D	23.11	23.42	0.910	0.922
D1	14.88	15.19	0.586	0.598
D2	7.52	7.82	0.296	0.308
E	7.42	7.57	0.292	0.298
E1	5.69	5.84	0.224	0.230
F	0.21	0.31	0.008	0.012
G	1.62	1.72	0.064	0.068
Q	3.15	3.30	0.124	0.130
R1	1.52		0.060	
R2	0.64		0.025	

Figure 12. Package dimensions



## 6 Revision history

Table 10. Document revision history

Date	Revision	Changes
01-Jun-2009	1	Initial release.

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