

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

Datasheet - production data

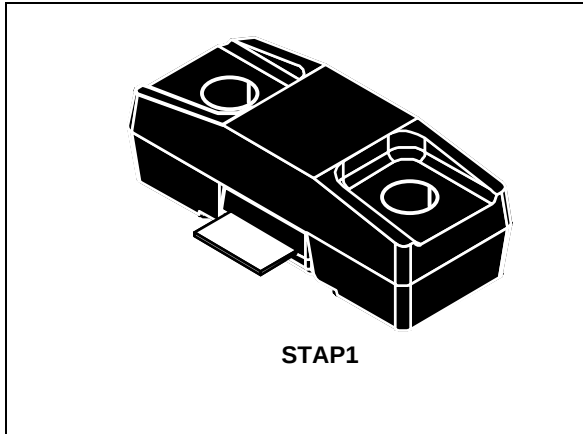
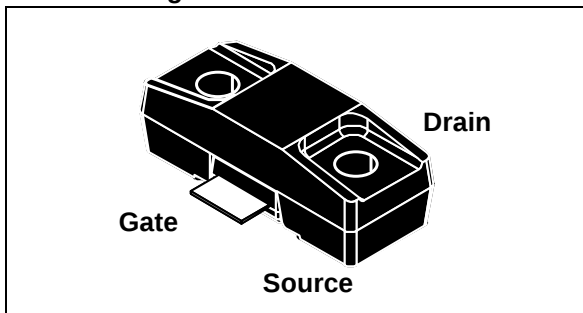


Figure 1. Pin connection



Description

The STAP85025S 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 a frequency up to 1 GHz. The STAP85025S boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in STAP® ST advanced PowerSO-10 RF package. The STAP85025S superior linearity performance makes it an ideal solution for the car mobile radio.

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

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

Table 1. Device summary

Order code	Marking	Package	Packing
STAP85025S	STAP85025S	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_{DSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 25\text{ V}$	-		1	μA
I_{GSS}	$V_{\text{GS}} = 5\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			1	μA
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 300\text{ mA}$		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_{ISS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 12.5\text{ V}$		55		pF
C_{OSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 12.5\text{ V}$		40		pF
C_{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_{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_{D}	$V_{\text{DD}} = 13.6\text{ V}$, $I_{\text{DQ}} = 300\text{ mA}$, $P_{\text{OUT}} = P_{\text{3dB}}$, $f = 870\text{ MHz}$	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

3 Impedance

Figure 2. Current conventions

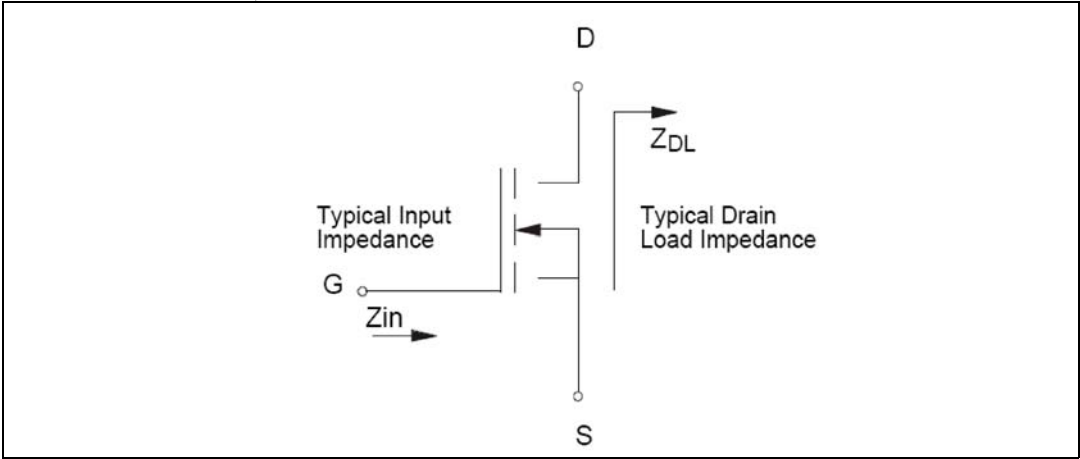


Table 7. Impedance data

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

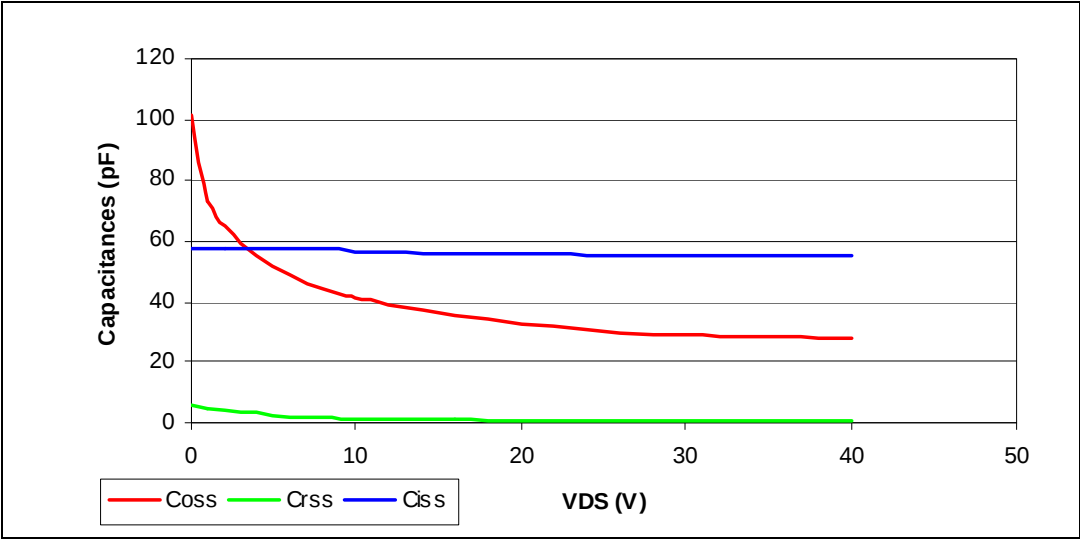


Figure 4. DC output characteristics (T_{amb} = -40 °C)

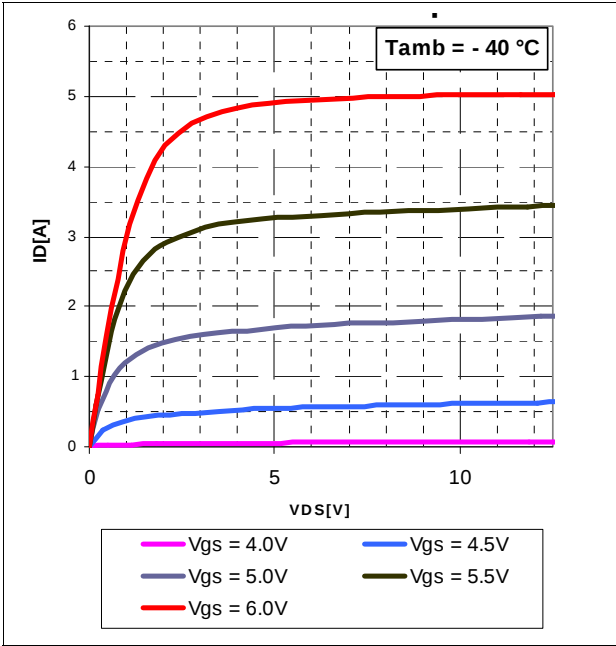


Figure 5. DC output characteristics (T_{amb} = 20 °C)

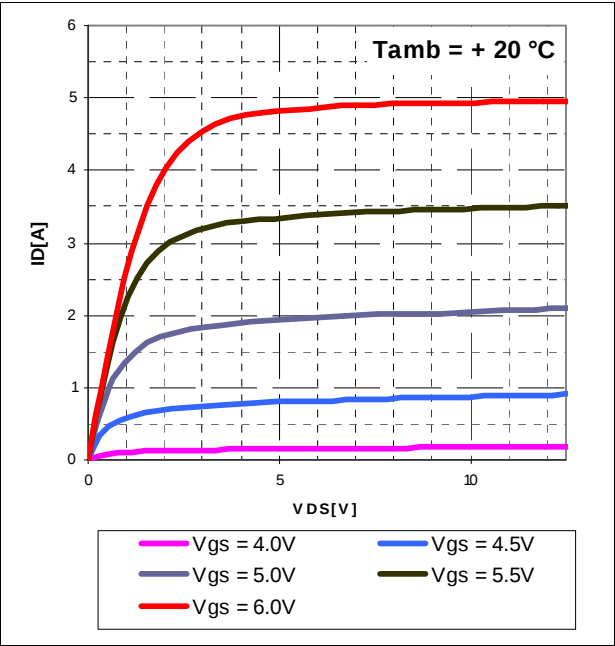


Figure 6. DC output characteristics
($T_{amb} = 60\text{ }^{\circ}\text{C}$)

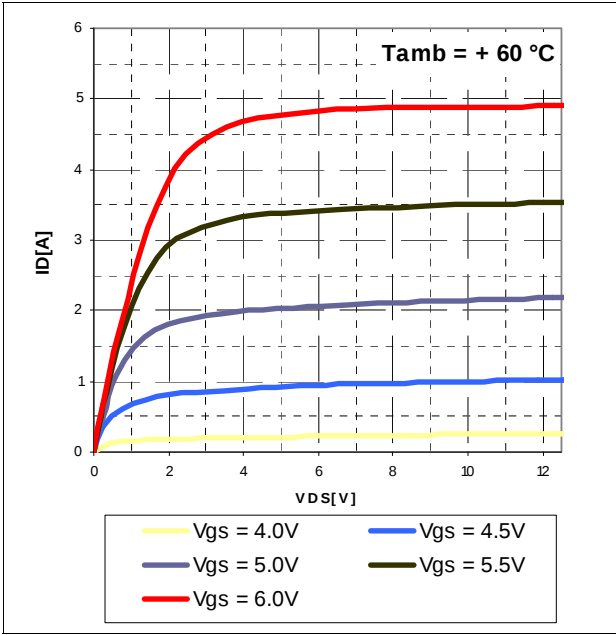


Figure 7. Gain vs. output power and bias current

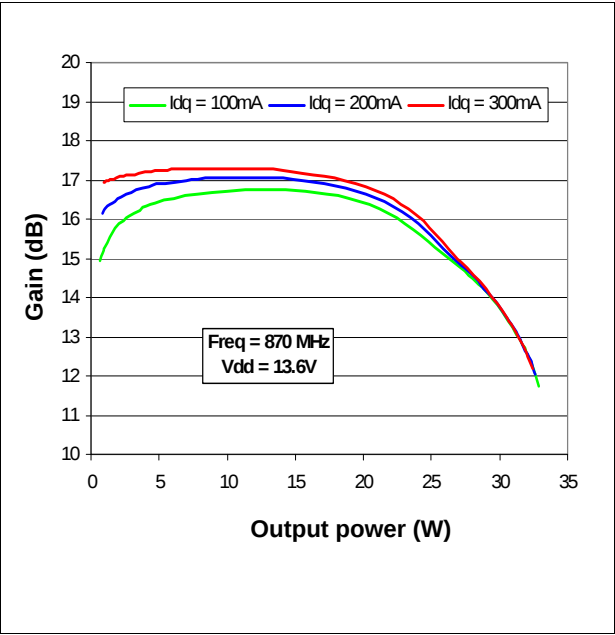


Figure 8. Output power and efficiency vs. input power

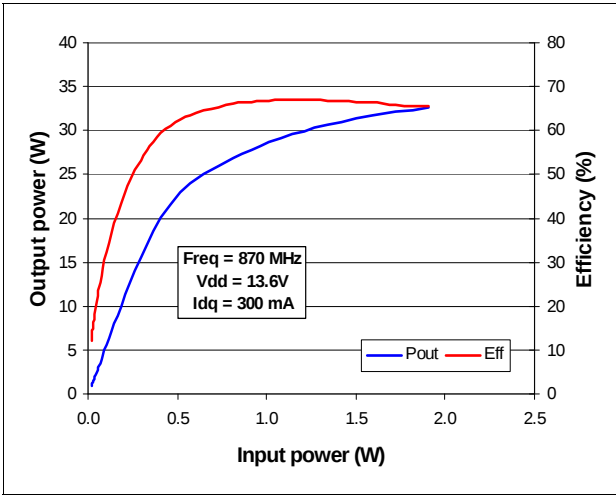


Figure 9. Output power and drain current vs. gate voltage

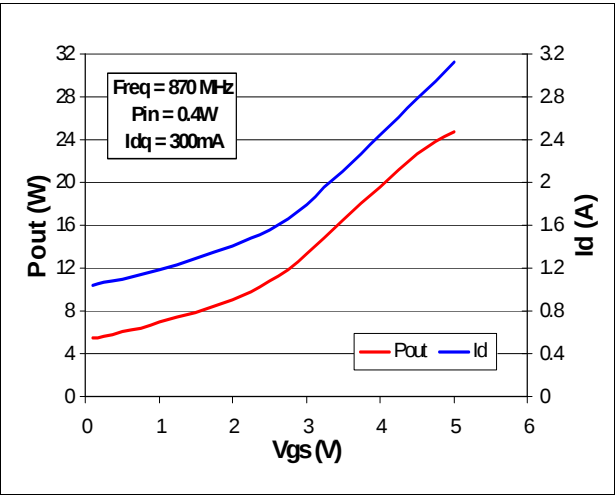


Figure 10. Pout and drain current vs. supply voltage ($P_{in} = 0.4\text{ W}$)

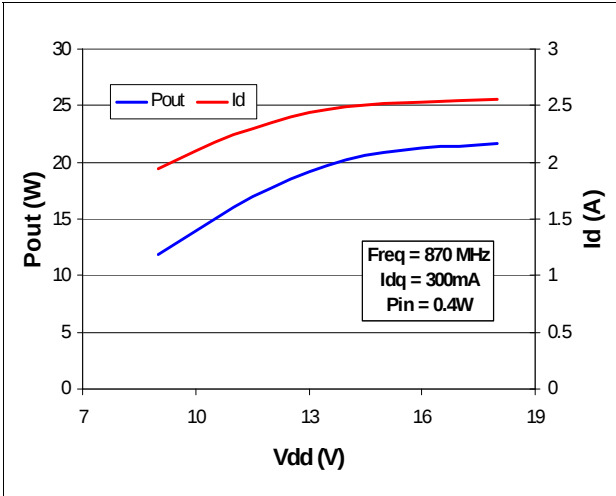
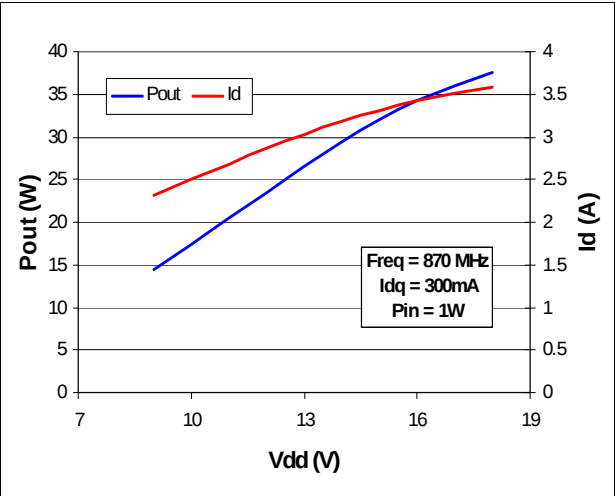


Figure 11. Pout and drain current vs. supply voltage ($P_{in} = 1\text{ W}$)



Prerelease product(s)

5 Mounting recommendations

The STAP® product family, comprising a combination of the ubiquitous PowerSO-10™ package and a smartly designed compression clamp, provides a system to achieve superior electro-mechanical contact between the PowerSO-10 heat slug and a heatsink in traditional bolt-down applications where through-the-board mounting and removal procedures are required. The clamp is bonded to the PowerSO-10 package with a formulated epoxy. The STAP® family is not recommended and should not be considered as a stand-alone package for surface mount soldering applications.

Mounting recommendations are available on www.st.com (see application note AN3232).

6 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.

6.1 STAP1 package information

Figure 12. STAP1 package outline

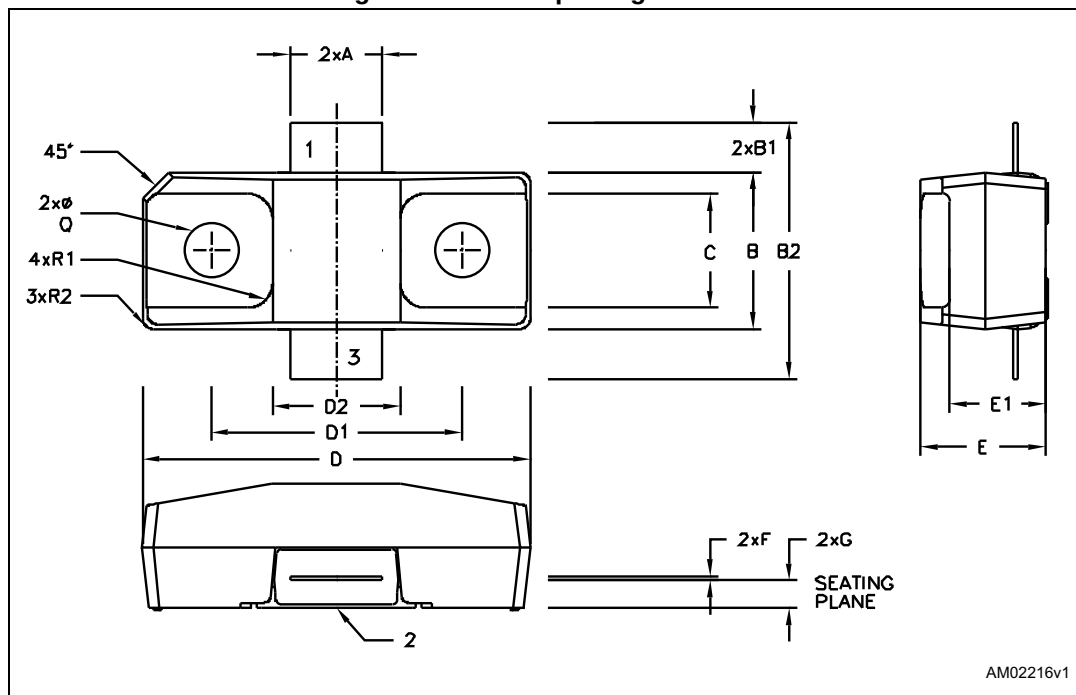


Table 8. STAP1 package mechanical data

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	

Prerelease product(s)

7 **Revision history**

Table 9. Document revision history

Date	Revision	Changes
01-Jun-2009	1	Initial release
02-Jul-2009	2	Deleted moisture sensitivity level table on page 4
20-Nov-2015	3	Updated description in cover page and added Section 5: Mounting recommendations. Minor text changes.
23-Nov-2015	4	Updated the part number in cover page. Minor text changes.
01-Dec-2015	5	Updated the Table 1: Device summary , and Section 5 .

Prerelease product(s)



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