



PD84006-E

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

Features

- Excellent thermal stability
- Common source configuration
- Broadband performances:
 $P_{OUT} = 6\text{ W}$ with 13 dB gain @ 870 MHz
- Plastic package
- ESD protection
- In compliance with the 2002/95/EC european directive

Description

The PD84006-E 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 7 V in common source mode at frequencies of up to 1 GHz boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, PowerSO-10RF 's superior linearity performance makes it an ideal solution for portable radio and UHF RFID reader. The PowerSO-10 plastic package, designed to offer high reliability, is the first ST JEDEC approved, high power SMD package. 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 (search for AN1294).

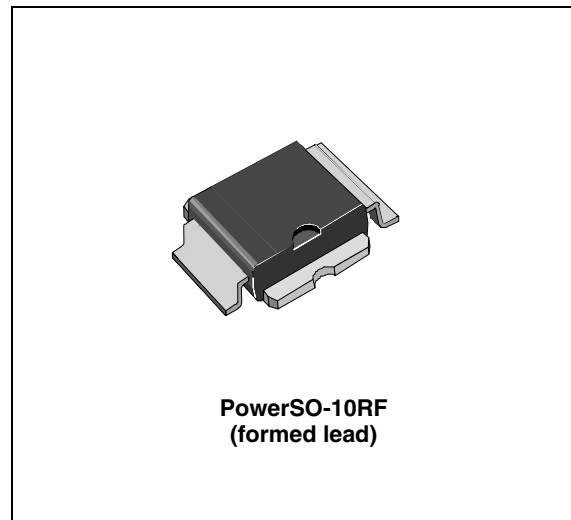


Figure 1. Pin connections

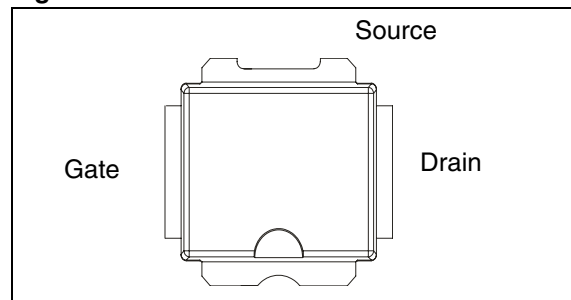


Table 1. Device summary

Order code	Package	Packaging
PD84006-E	PowerSO-10RF (formed lead)	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	25	V
V_{GS}	Gate-source voltage	-0.5 to +15	V
I_D	Drain current	5	A
P_{DISS}	Power dissipation (@ $T_C = 70\text{ °C}$)	59	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	1.6	°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	
I_{DSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 25\text{ V}$	-		1	μA	
I_{GSS}	$V_{GS} = 5\text{ V}$	$V_{DS} = 0\text{ V}$			1	μA	
$V_{GS(Q)}$	$V_{DS} = 10\text{ V}$	$I_D = 150\text{ mA}$		3.4		V	
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 1\text{ A}$		0.34		V	
C_{ISS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		$f = 1\text{ MHz}$	40		pF
C_{OSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		$f = 1\text{ MHz}$	33		pF
C_{RSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		$f = 1\text{ MHz}$	1.45		pF

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
P_{3dB}	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 150\text{ mA}$	$f = 870\text{ MHz}$	5	6	-	W
G_P	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 150\text{ mA}$, $P_{OUT} = 2\text{ W}$, $f = 870\text{ MHz}$		15			dB
h_D	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 150\text{ mA}$, $P_{OUT} = P_{3dB}$, $f = 870\text{ MHz}$		50	60		%
Load mismatch	$V_{DD} = 9.5\text{ V}$, $I_{DQ} = 150\text{ mA}$, $P_{OUT} = 8\text{ W}$, $f = 870\text{ MHz}$ 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 Typical performances

Figure 2. Output power and efficiency vs. frequency $V_{dd} = 7.2\text{ V}$, $I_{dq} = 200\text{ mA}$, $P_{in} = 24\text{ dBm}$

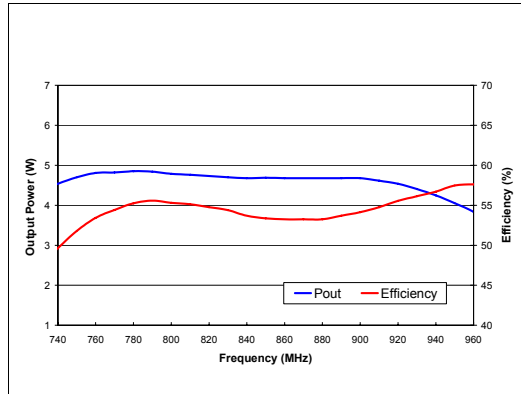


Figure 3. Gain vs. output power $V_{dd} = 7.2\text{ V}$, $I_{dq} = 200\text{ mA}$

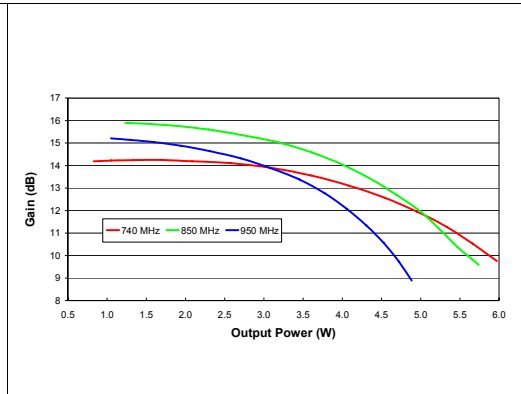


Figure 4. Input return loss vs. frequency $V_{dd} = 7.2\text{ V}$, $I_{dq} = 200\text{ mA}$

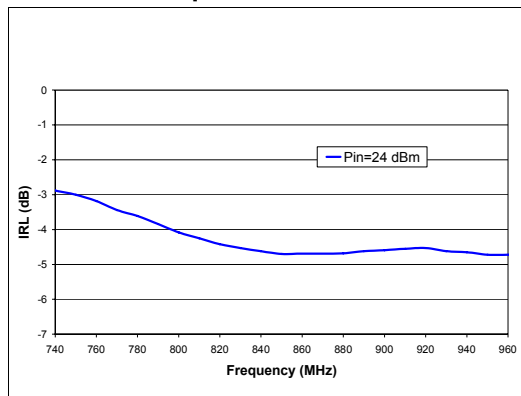


Figure 5. Harmonics vs. frequency $V_{dd} = 7.2\text{ V}$, $I_{dq} = 200\text{ mA}$, $P_{in} = 24\text{ dBm}$

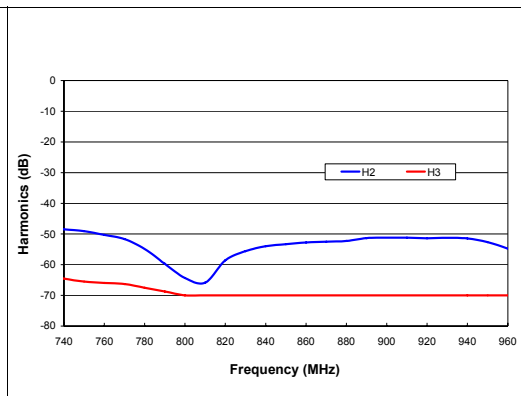
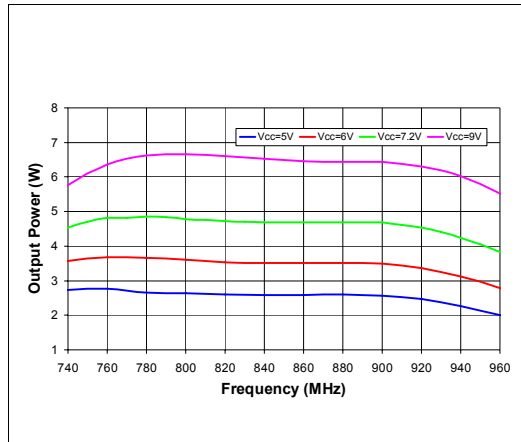


Figure 6. Output power vs. frequency and supply voltage $P_{in} = 24\text{ dBm}$, $I_{dq} = 200\text{ mA}$



4 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. ECOPACK[®] is an ST trademark.

Table 7. PowerSO-10RF formed lead (gull wing) mechanical data

Dim.	mm.			Inch.		
	Min	Typ	Max	Min	Typ	Max
A1	0	0.05	0.1	0.	0.0019	0.0038
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	13.85	14.1	14.35	0.544	0.555	0.565
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
L	0.8	1	1.1	0.030	0.039	0.042
R1			0.25			0.01
R2		0.8			0.031	
T	2 deg	5 deg	8 deg	2 deg	5 deg	8 deg
T1		6 deg			6 deg	
T2		10 deg			10 deg	

Note: Resin protrusions not included (max value: 0.15 mm per side)

Figure 7. Package dimensions

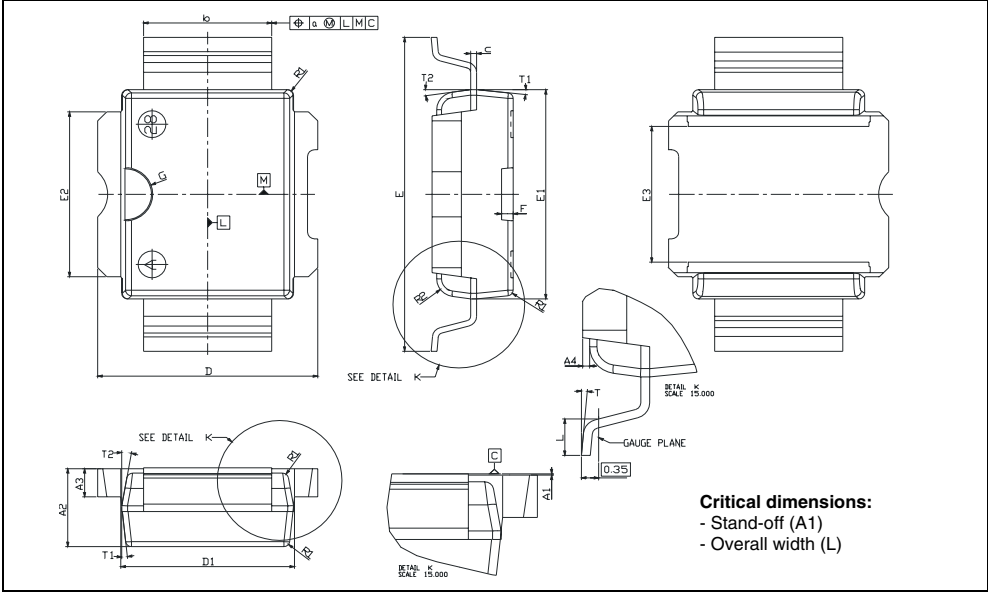
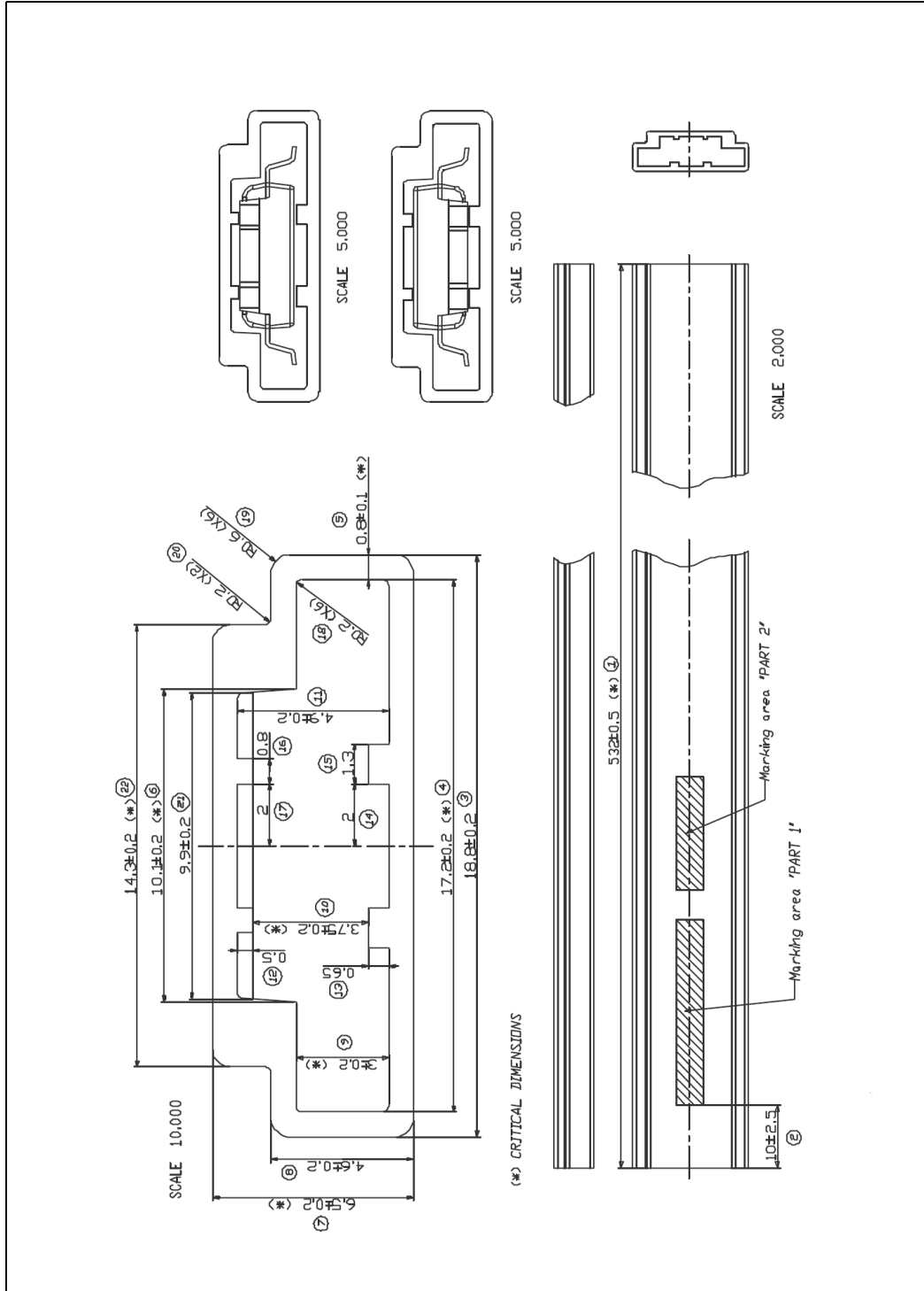


Figure 8. Tube information



5 Revision history

Table 8. Document revision history

Date	Revision	Changes
07-Aug-2009	1	Initial release

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