

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

Datasheet –production data

### Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 15\text{ W}$  with 16 dB gain @ 870 MHz / 13.6 V
- Plastic package
- ESD protection
- In compliance with the 2002/95/EC European directive

### Description

The PD85015-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 13.6 V in common source mode at frequencies of up to 1 GHz. The PD85015-E boasts excellent gain, linearity and reliability thanks to ST's latest LDMOS technology mounted on the first true SMD plastic RF power package, the PowerSO-10RF. The superior linearity of the device makes it an ideal solution for car radios. The PowerSO-10 plastic package, designed for high reliability, is the first JEDEC approved, high power SMD package from ST. It is optimized for RF requirements, and offers excellent RF performance and ease of assembly.

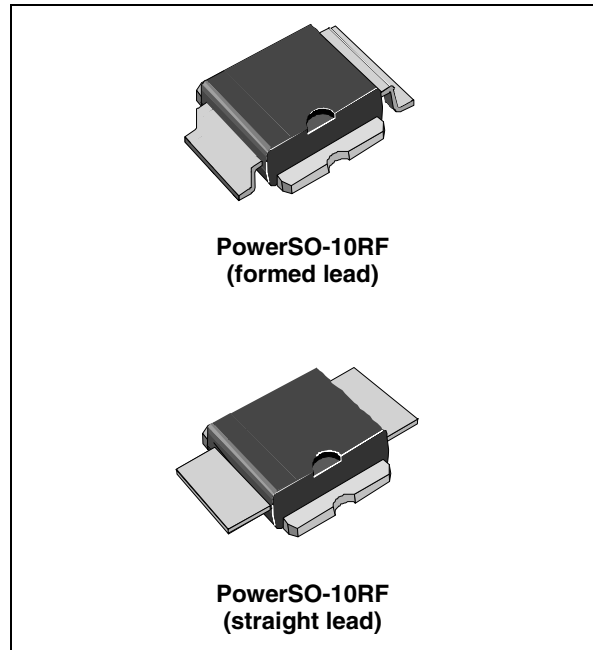


Figure 1. Pin connection

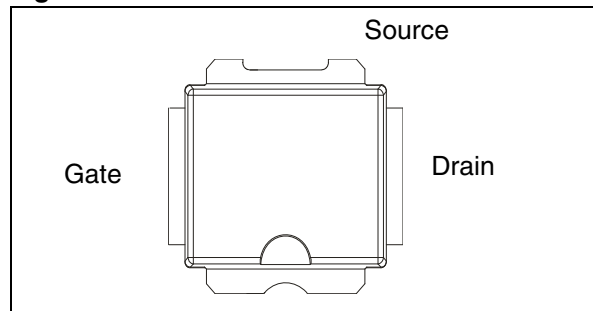


Table 1. Device summary

Order codes	Package	Packaging
PD85015-E	PowerSO-10RF (formed lead)	Tube
PD85015S-E	PowerSO-10RF (straight lead)	Tube
PD85015TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD85015STR-E	PowerSO-10RF (straight lead)	Tape and reel

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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	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
$I_{DSS}$	$V_{GS} = 0V$	$V_{DS} = 25 V$			1	$\mu A$
$I_{GSS}$	$V_{GS} = 5 V$	$V_{DS} = 0 V$			1	$\mu A$
$V_{GS(Q)}$	$V_{DS} = 10 V$	$I_D = 150\text{ mA}$	3.0		4.3	V
$V_{DS(ON)}$	$V_{GS} = 10 V$	$I_D = 1 A$		0.34		V
$C_{ISS}$	$V_{GS} = 0V$	$V_{DS} = 12.5 V$		45		pF
$C_{OSS}$	$V_{GS} = 0V$	$V_{DS} = 12.5 V$		36		pF
$C_{RSS}$	$V_{GS} = 0V$	$V_{DS} = 12.5 V$		1.2		pF

### 2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
P3dB	$V_{DD} = 13.6 V, I_{DQ} = 150\text{ mA}$	$f = 870\text{ MHz}$	15	20	-	W
$G_P$	$V_{DD} = 13.6 V, I_{DQ} = 150\text{ mA}, P_{OUT} = 15\text{ W}, f = 870\text{ MHz}$		16			dB
$h_D$	$V_{DD} = 13.6 V, I_{DQ} = 150\text{ mA}, P_{OUT} = P_{3dB}, f = 870\text{ MHz}$		60	70		%
Load mismatch	$V_{DD} = 1.7 V, I_{DQ} = 300\text{ mA}, P_{OUT} = 25\text{ W}, f = 870\text{ MHz}$ 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

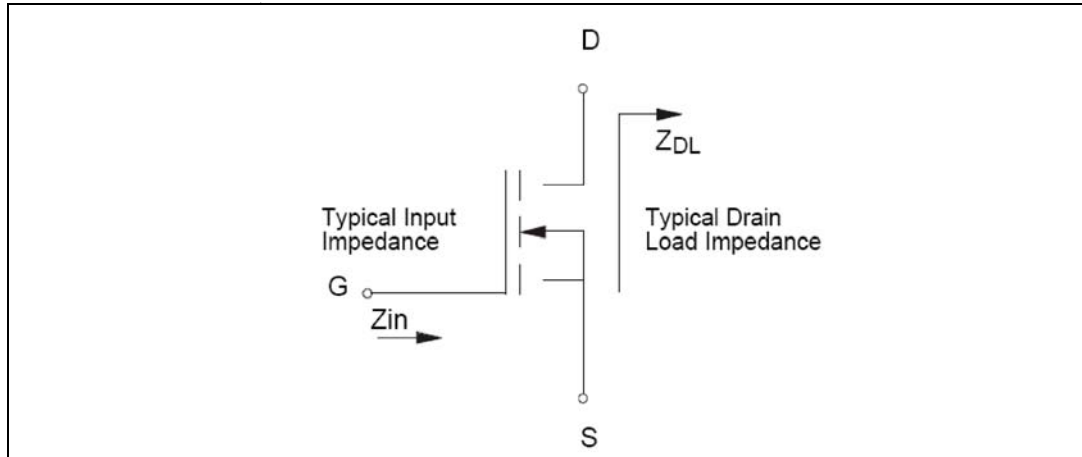


Table 7. Impedance data

Frequency	$Z_{IN} (\Omega)$	$Z_{DL} (\Omega)$
500 MHz	$0.536 - j 2.968$	$4.930 + j 1.083$
600 MHz	$0.557 - j 1.224$	$4.329 + j 0.811$
700 MHz	$0.595 + j 0.236$	$3.784 + j 0.429$
800 MHz	$0.651 + j 1.512$	$3.305 - j 0.031$
900 MHz	$0.708 + j 2.671$	$2.889 - j 0.542$
1000 MHz	$0.761 + j 3.759$	$2.534 - j 1.085$

# 4 Typical performances

Figure 3. Drain current vs gate voltage Figure 4. DC output characteristics

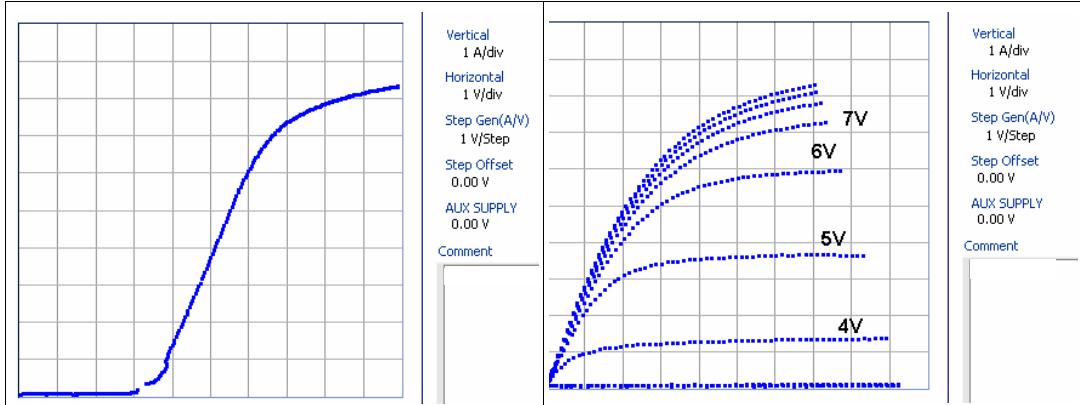
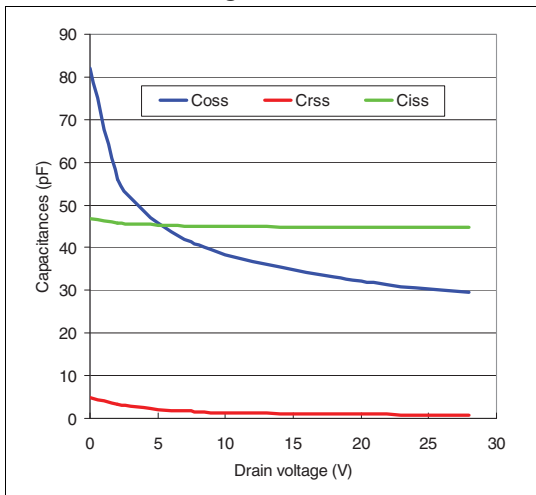


Figure 5. Capacitances vs drain voltage



## 5 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<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Table 8. 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 6. Package dimensions

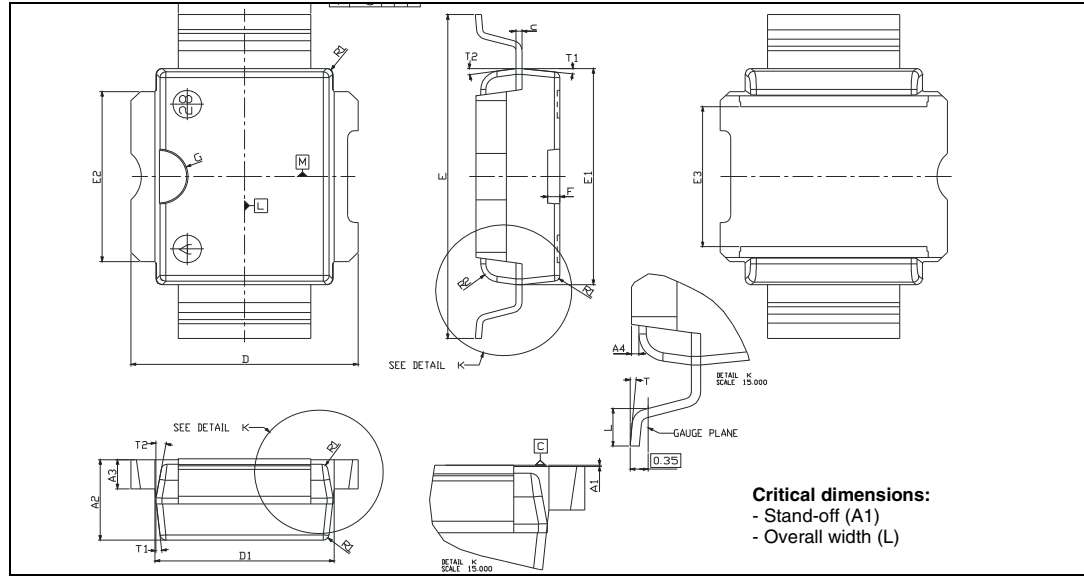
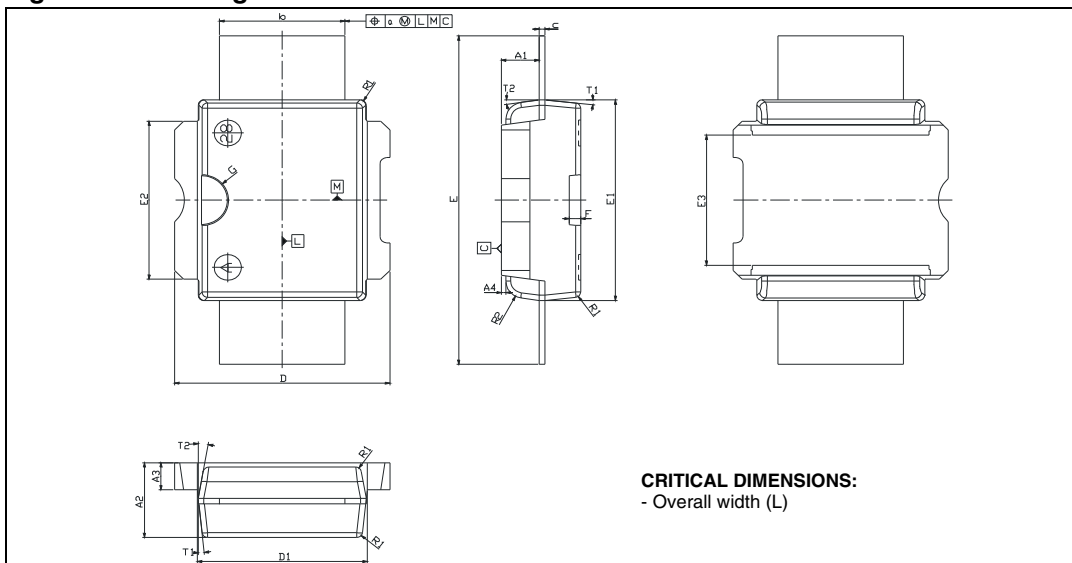


Table 9. PowerSO-10RF straight lead mechanical data

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A1	1.62	1.67	1.72	0.064	0.065	0.068
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	15.15	15.4	15.65	0.595	0.606	0.615
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	
R1			0.25			0.01
R2		0.8			0.031	
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







## 6 Revision history

**Table 10. Document revision history**

Date	Revision	Changes
10-Mar-2008	1	Initial release
06-Jul-2009	2	Document status promoted from preliminary data to datasheet.
13-Dec-2011	3	Updated values in <a href="#">Table 7: Impedance data</a> .
24-May-2012	4	Updated $V_{GS(Q)}$ in <a href="#">Figure 4: DC output characteristics</a> .

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