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PD84008-E

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

Preliminary data

Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 8\text{ W}$ with 14.7 dB gain @ 870 MHz / 7.5 V
- Plastic package
- ESD protection
- In compliance with the 2002/95/EC european directive

Description

The PD84008-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. PD84008-E 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. PD84008-E's superior linearity performance makes it an ideal solution for portable radio applications.

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.

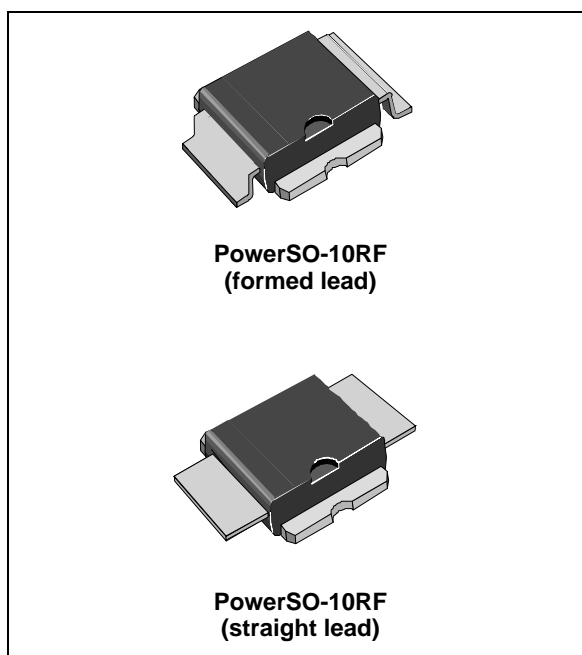


Figure 1. Pin connection

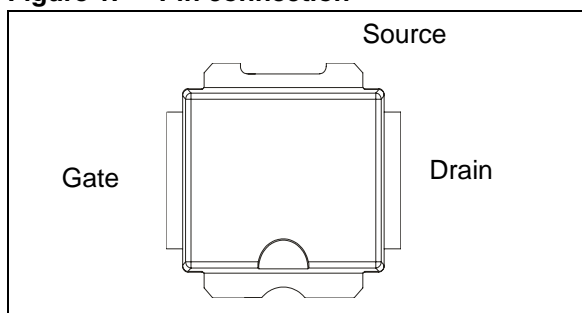


Table 1. Device summary

Part number	Package	Packing
PD84008-E	PowerSO-10RF (formed lead)	Tube
PD84008S-E	PowerSO-10RF (straight lead)	Tube
PD84008TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD84008STR-E	PowerSO-10RF (straight lead)	Tape and reel

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1 Electrical data

1.1 Maximum ratings

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

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	7	A
P_{DISS}	Power dissipation (@ $T_C = 70^{\circ}C$)	79	W
T_J	Max. operating junction temperature	165	$^{\circ}C$
T_{STG}	Storage temperature	-65 to +150	$^{\circ}C$

1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	1.2	$^{\circ}C/W$

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}	$V_{GS} = 20\text{ V}$	$V_{DS} = 0\text{ V}$			1	μA
$V_{GS(Q)}$	$V_{DS} = 10\text{ V}$	$I_D = 250\text{ mA}$	3.2		4.8	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 1\text{ A}$		0.27	0.31	V
C_{ISS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		56		pF
C_{OSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		47		pF
C_{RSS}	$V_{GS} = 0\text{ V}$	$V_{DS} = 7\text{ V}$		2.2		pF

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
P3dB	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 250\text{ mA}$	$f = 870\text{ MHz}$	8	9.5		W
G_P	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 250\text{ mA}$, $P_{OUT} = 2\text{ W}$, $f = 870\text{ MHz}$		13	16.2		dB
h_D	$V_{DD} = 7.5\text{ V}$, $I_{DQ} = 250\text{ mA}$, $P_{OUT} = P_{3dB}$, $f = 870\text{ MHz}$		55	65		%
Load mismatch	$V_{DD} = 9.5\text{ V}$, $I_{DQ} = 250\text{ mA}$, $P_{OUT} = 15\text{ W}$, $f = 870\text{ MHz}$ 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 methodology	Rating
J-STD-020B	MSL 3

3 Impedance

Figure 2. Current conventions

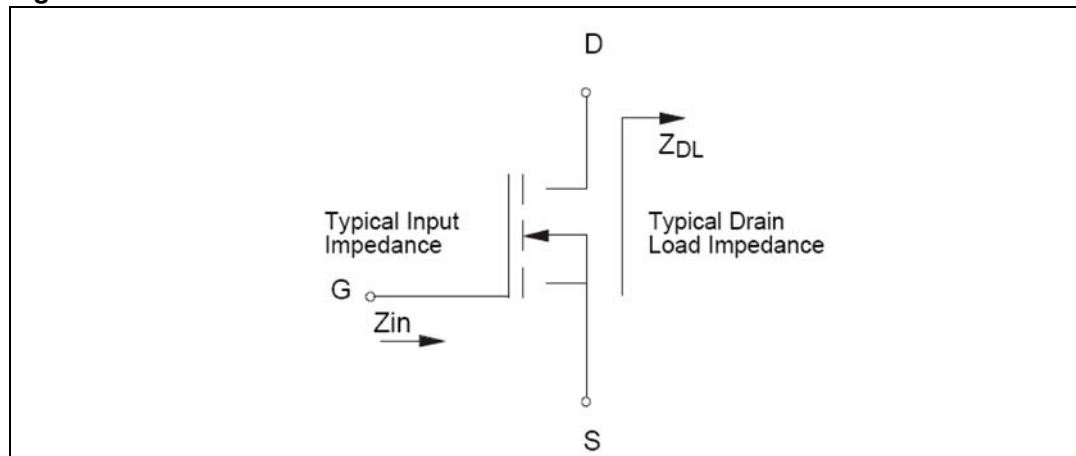


Table 8. Impedance data

Freq. (MHz)	$Z_{IN} (\Omega)$	$Z_{DL}(\Omega)$
870 MHz	$0.38 + j 0.94$	$1.36 - j 0.48$

4 Typical performance

Figure 3. Capacitances vs drain voltage

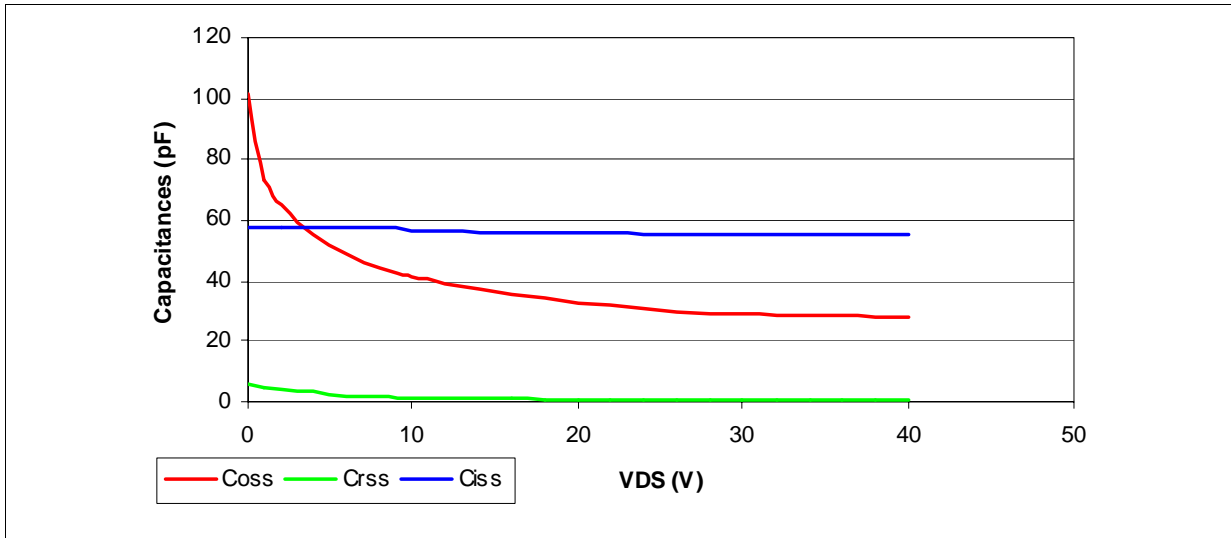


Figure 4. DC output characteristics

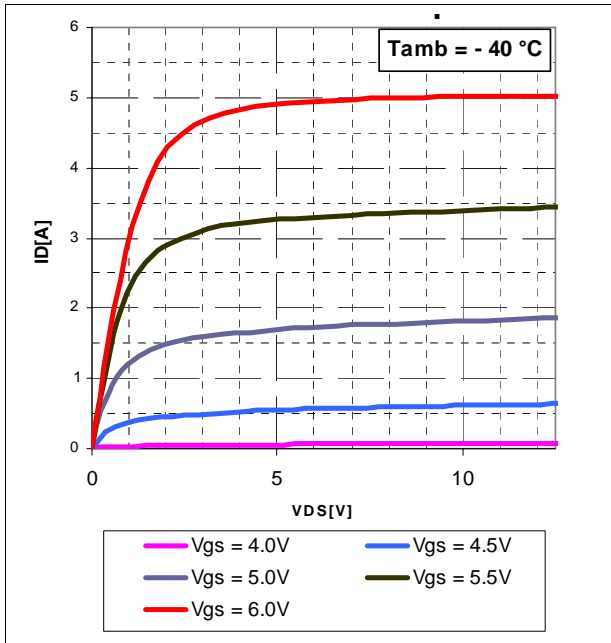
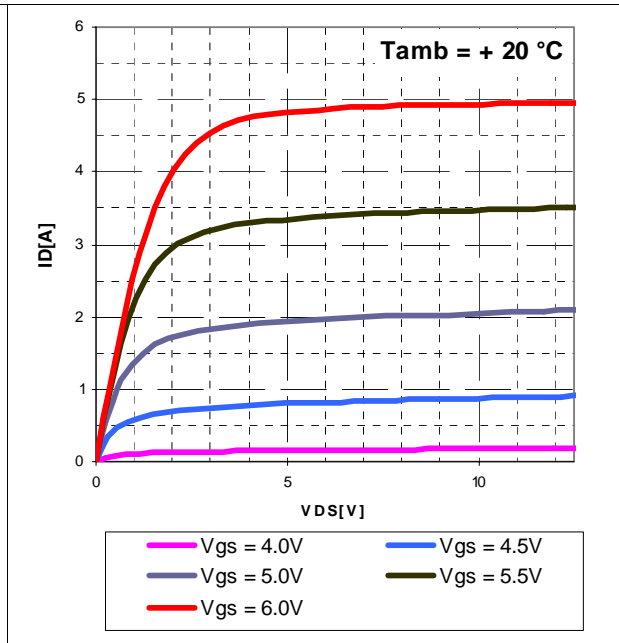


Figure 5. DC output characteristics



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Typical performance

Figure 6. DC output characteristics

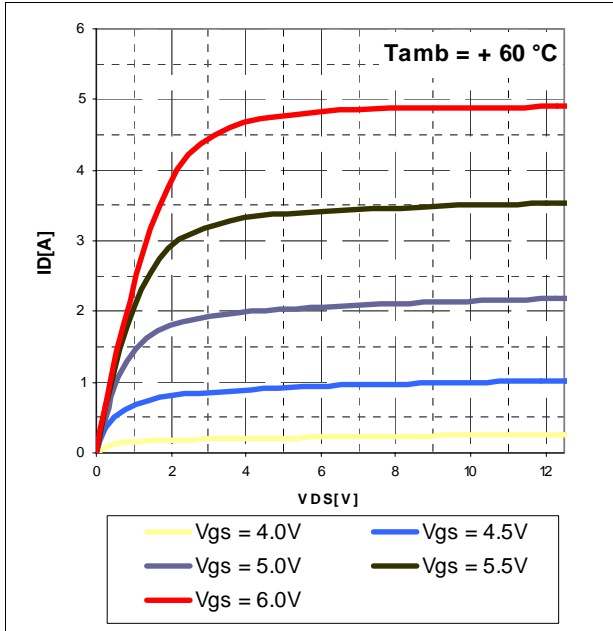


Figure 7. Gain vs output power and bias current

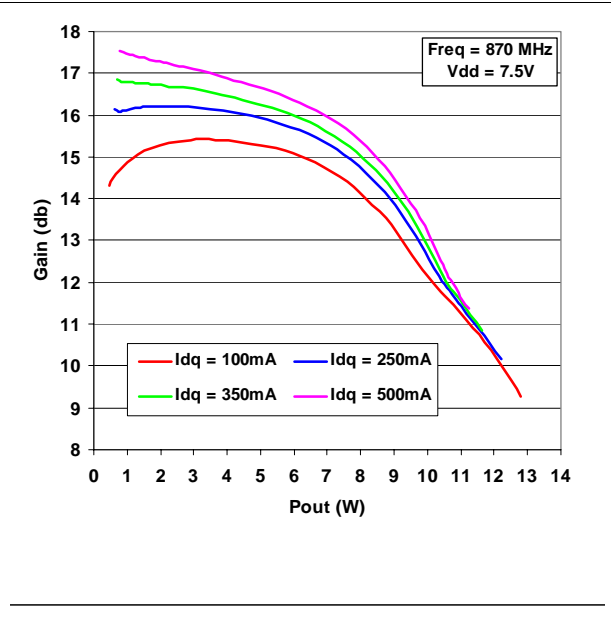


Figure 8. Gain and efficiency vs P_{OUT}

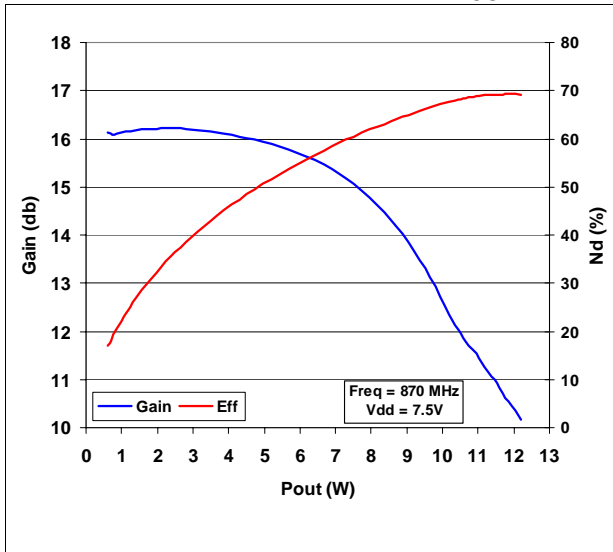
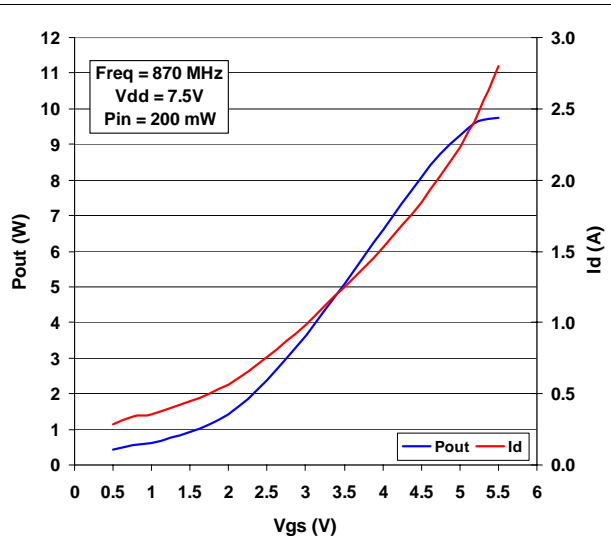


Figure 9. P_{out} and I_d vs V_{gs}



Typical performance

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Figure 10. Pout and Id vs Vgs

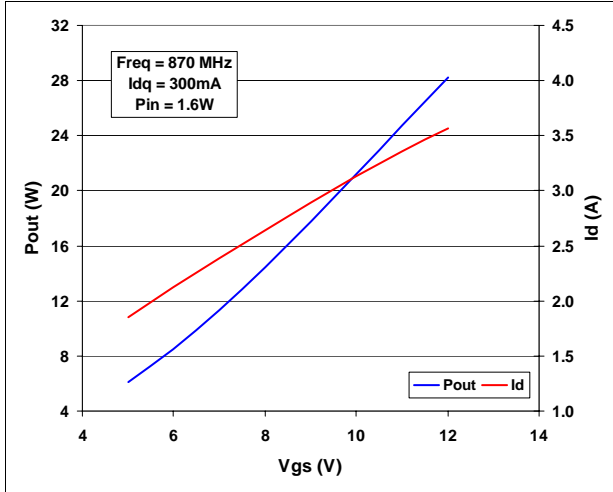


Figure 11. Pout and Id vs V_{DD}

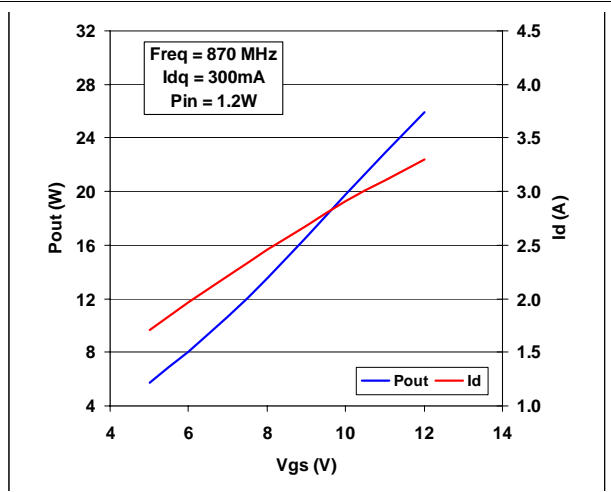


Figure 12. Pout and Id vs V_{DD}

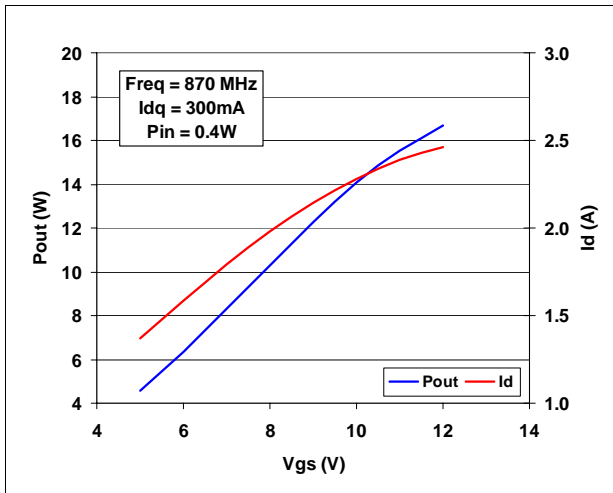


Figure 13. Pout and Id vs V_{DD}

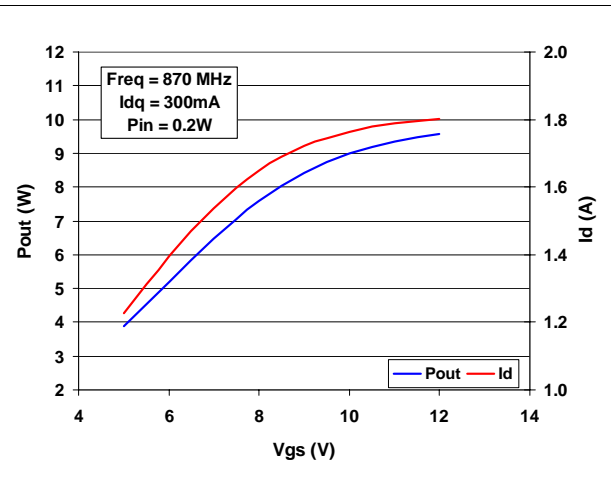
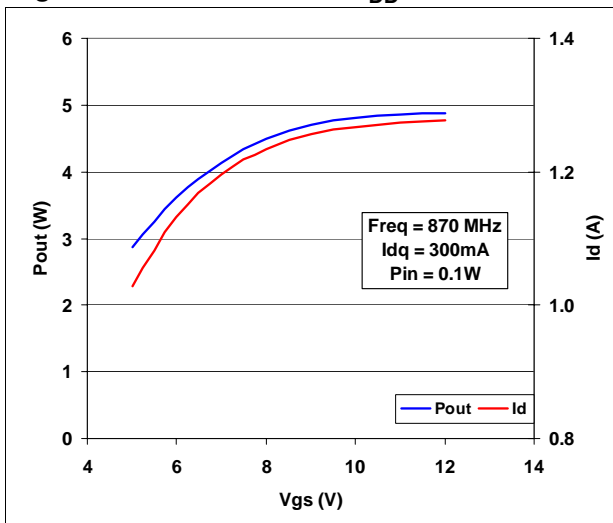


Figure 14. Pout and Id vs V_{DD}



5 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.

Package mechanical data

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Table 9. 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)

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Package mechanical data

Figure 15. Package dimensions

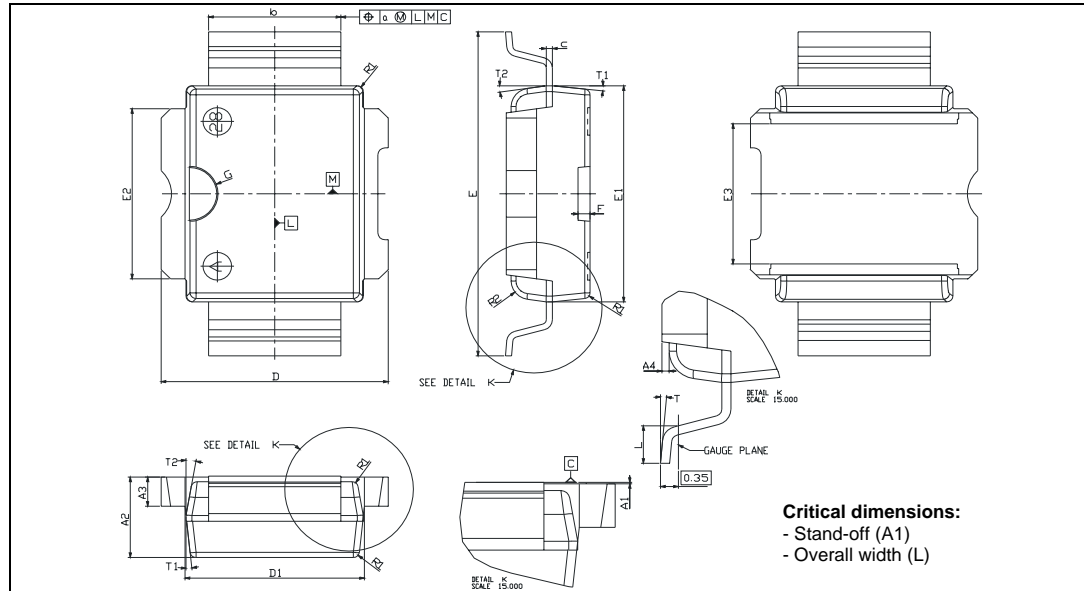


Table 10. PowerSO-10RF straight lead mechanical data

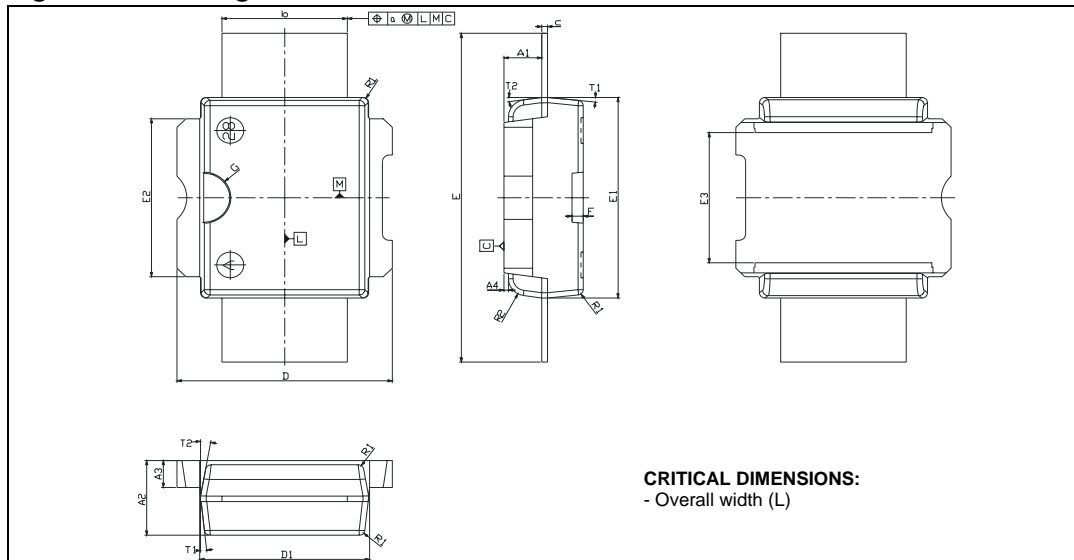
Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A1	1.62	1.67	1.72	0.064	0.065	0.068
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	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	

Package mechanical data

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

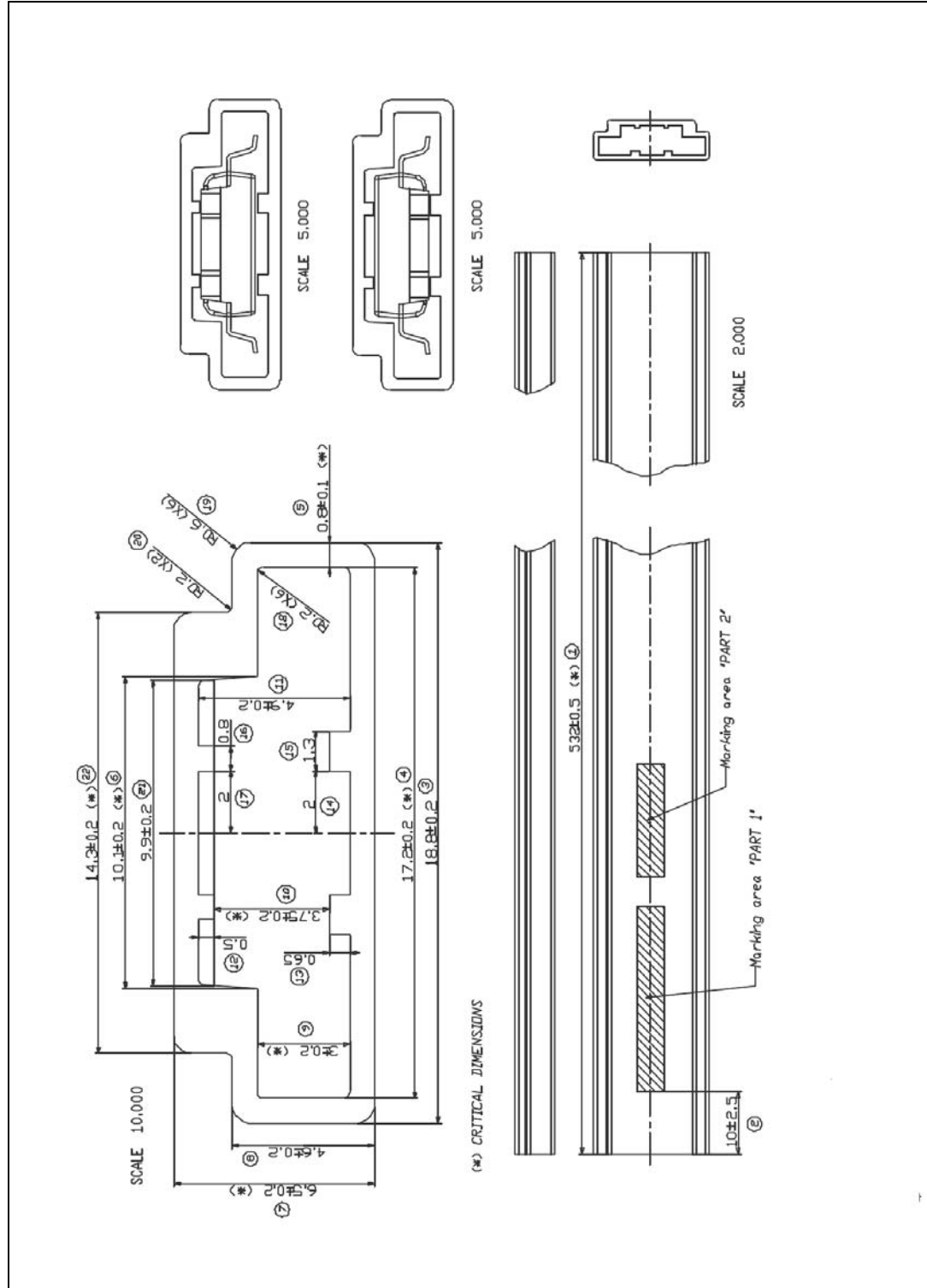
Figure 16. Package dimensions



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Package mechanical data

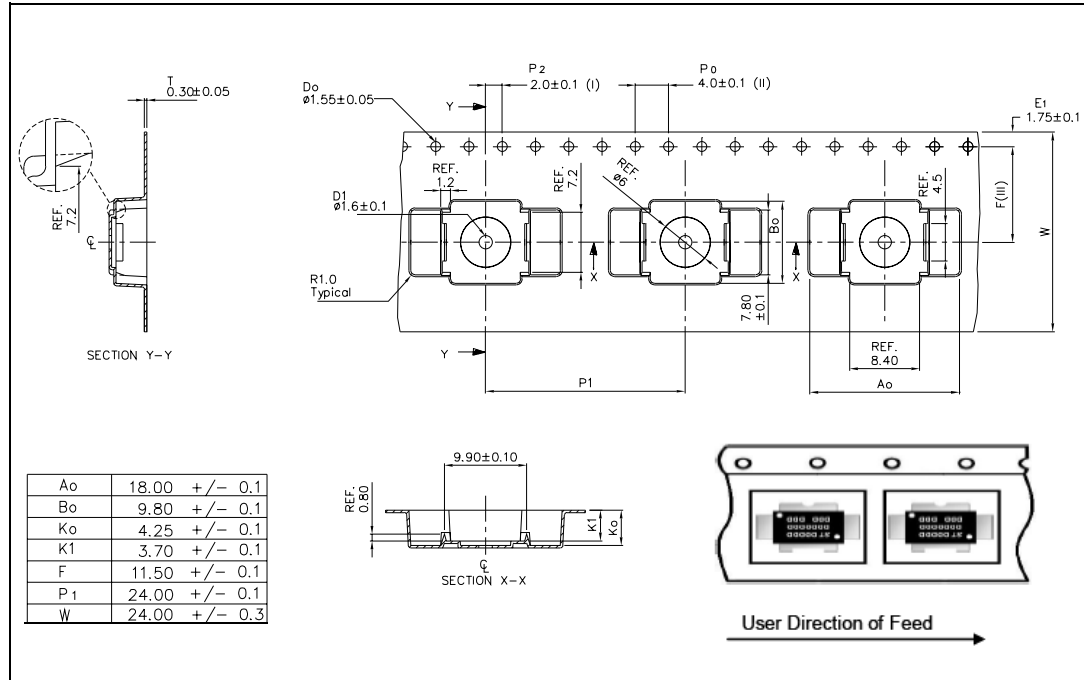
Figure 17. Tube information



Package mechanical data

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Figure 18. Reel information



6 Revision history

Table 11. Document revision history

Date	Revision	Changes
05-Dec-2007	1	Initial release.
28-Jun-2011	2	Updated Table 4 .

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