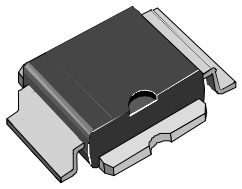
PD84010-E

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

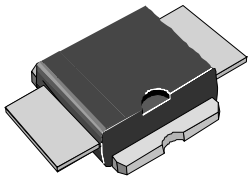
Datasheet — production data

Features

- Excellent thermal stability
- Common source configuration
- P_{OUT} = 10 W with 14.3 dB gain @ 870 MHz / 7.5 V
- Plastic package
- ESD protection
- In compliance with the 2002/95/EC European directive



PowerSO-10RF (formed lead)



PowerSO-10RF (straight lead)

Description

The PD84010-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 7.5 V in common source mode at frequencies of up to 1 GHz. PD84010-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. PD84010-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

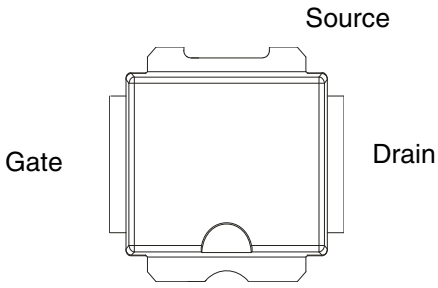


Table 1. Device summary

Order codes	Package	Packing
PD84010-E	PowerSO-10RF (formed lead)	Tube
PD84010TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD84010STR-E	PowerSO-10RF (straight lead)	Tape and reel

This is information on a product in full production. www.st.com

Contents

1 **Electrical data** 3
1.1 Maximum ratings 3
1.2 Thermal data 3

2 **Electrical characteristics** 4
2.1 Static 4
2.2 Dynamic 4
2.3 ESD protection characteristics 4
2.4 Moisture sensitivity level 5

3 **Impedance** 5

4 **Typical performance** 6

5 **Package mechanical data** 8

6 **Revision history** 14

1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings (T_{CASE} = 25°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	8	A
P_{DISS}	Power dissipation (@ T_C = 70 °C)	95	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	1.0	°C/W

2 Electrical characteristics

T_{CASE} = +25 °C

2.1 Static

Table 4. Static

Symbol	Test conditions			Min	Typ	Max	Unit
I_{DSS}	V_{GS} = 0 V	V_{DS} = 25 V				1	µA
I_{GSS}	V_{GS} = 5 V	V_{DS} = 0 V				1	µA
$V_{GS(Q)}$	V_{DS} = 10 V	I_D = 250 mA		3.4		4.6	V
$V_{DS(ON)}$	V_{GS} = 10 V	I_D = 3 A			0.64	0.7	V
C_{ISS}	V_{GS} = 0 V	V_{DS} = 7 V	f = 1 MHz		77		pF
C_{OSS}	V_{GS} = 0 V	V_{DS} = 7 V	f = 1 MHz		54		pF
C_{RSS}	V_{GS} = 0 V	V_{DS} = 7 V	f = 1 MHz		2.3		pF

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P3dB	V_{DD} = 7.5 V, I_{DQ} = 300 mA f = 870 MHz	10	12		W
G_P	V_{DD} = 7.5 V, I_{DQ} = 300 mA, P_{OUT} = 2 W, f = 870 MHz	15	16.3		dB
h_D	V_{DD} = 7.5 V, I_{DQ} = 300 mA, P_{OUT} = P3dB, f = 870 MHz	60	73		%
Load mismatch	V_{DD} = 9.5 V, I_{DQ} = 300 mA, P_{OUT} = 20 W, f = 870 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

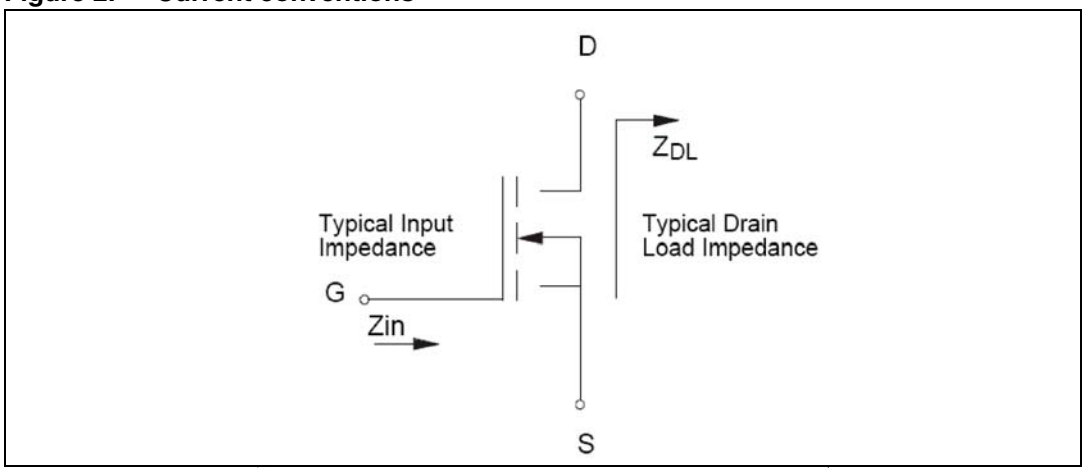


Table 8. Impedance data

Frequency (MHz)	Z_{IN} (Ω)	Z_{DL}(Ω)
870 MHz	0.35 +j 1.1	1.53 -j 0.23

4 Typical performance

Figure 3. Threshold voltage

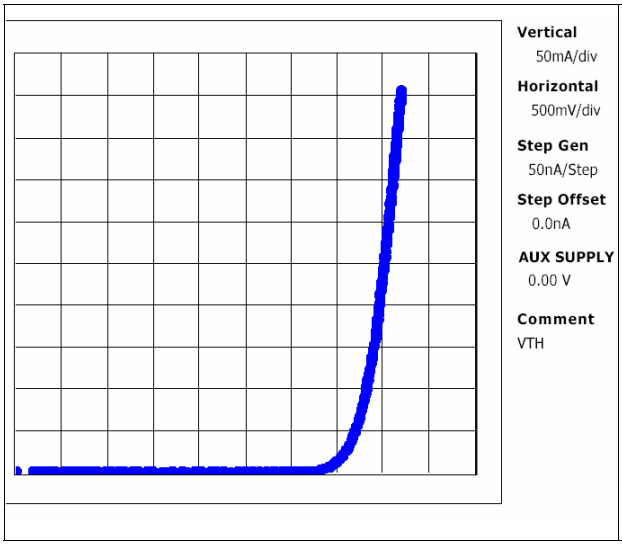


Figure 4. DC output characteristic

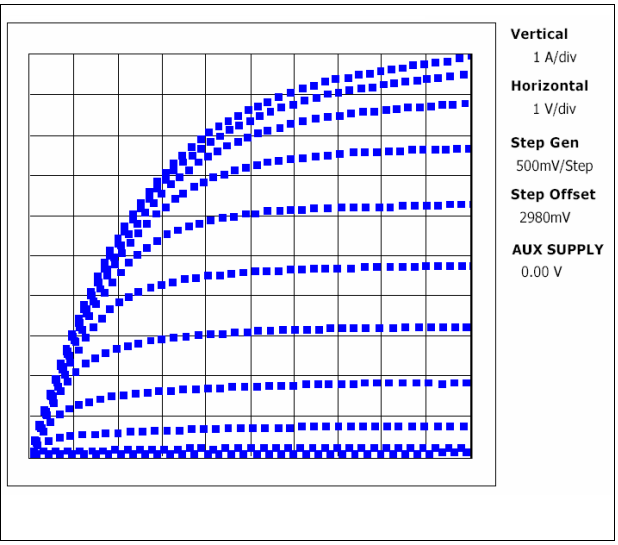


Figure 5. ID vs VGS

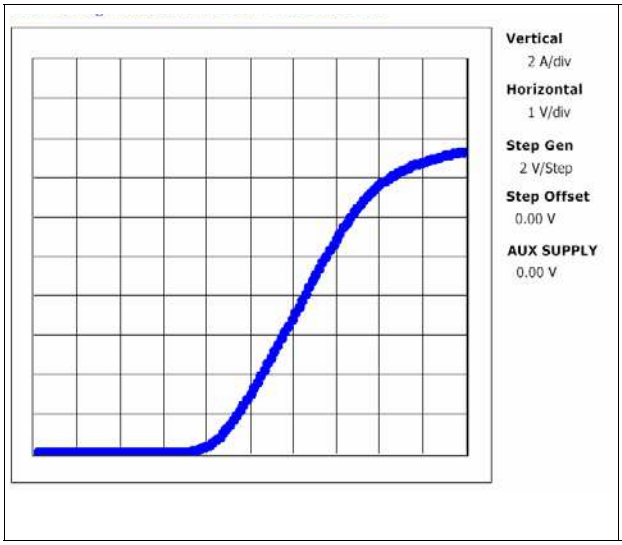


Figure 6. Capacitances vs voltage

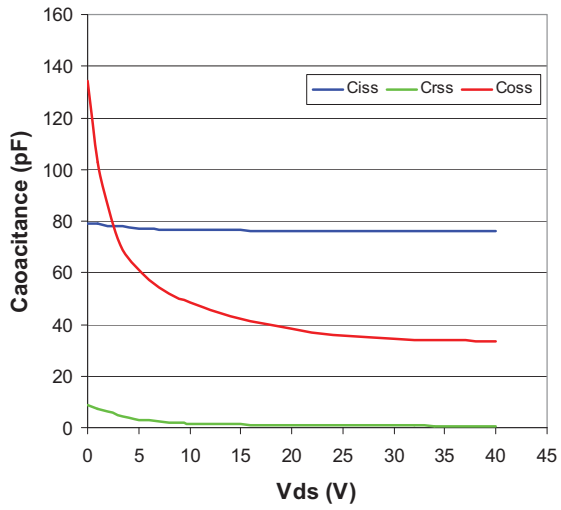


Figure 7. Pout and Id vs V_{GS}

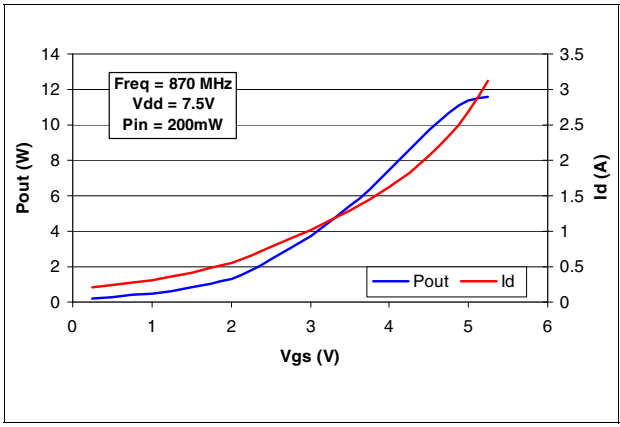


Figure 8. Pout and Id vs supply voltage @ Pin = 200 mW

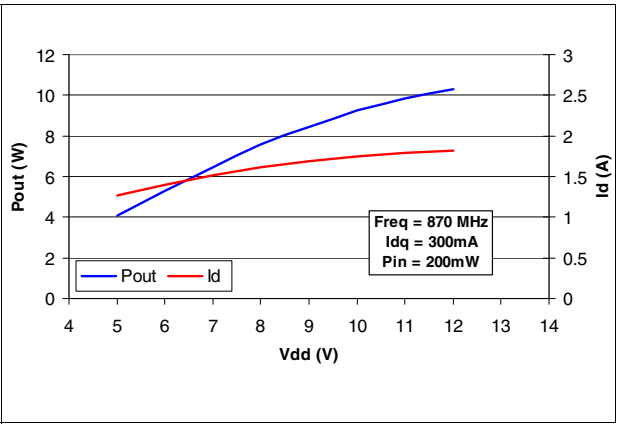


Figure 9. Pout and id vs supply voltage @ Pin = 400 mW

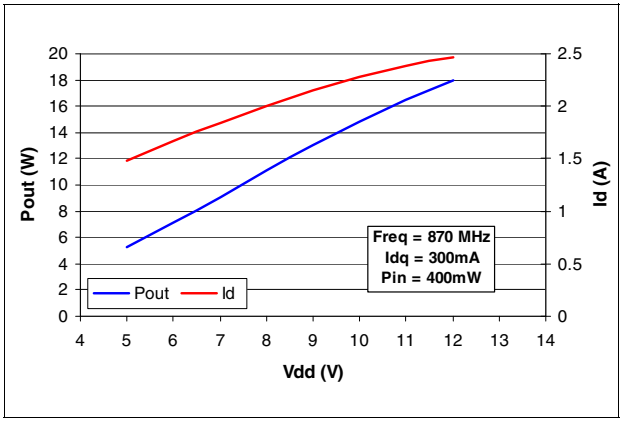


Figure 10. Pout and id vs supply voltage @ Pin = 800 mW

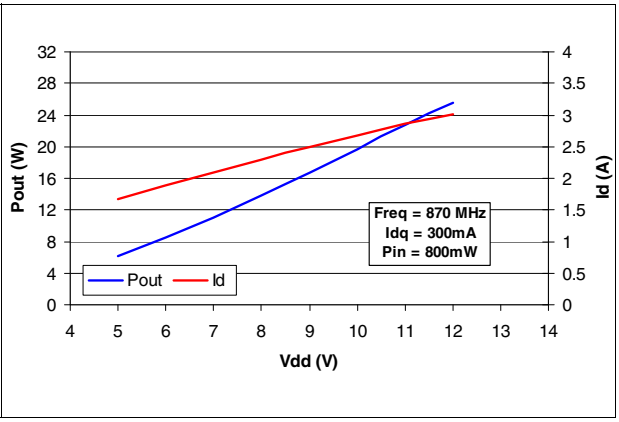


Figure 11. Gain vs Pout and bias current

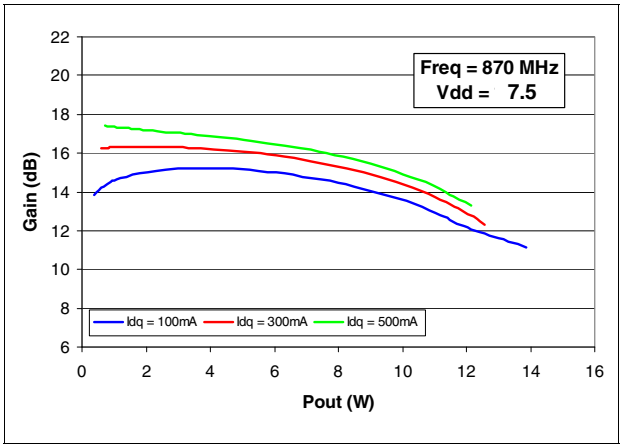
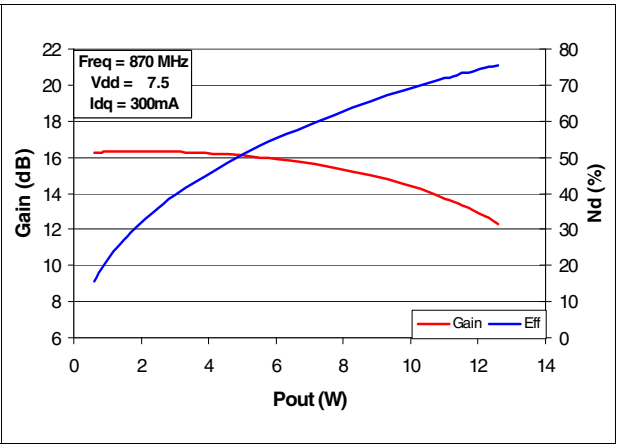


Figure 12. Gain and efficiency vs Pout



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.

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)

Figure 13. Package dimensions

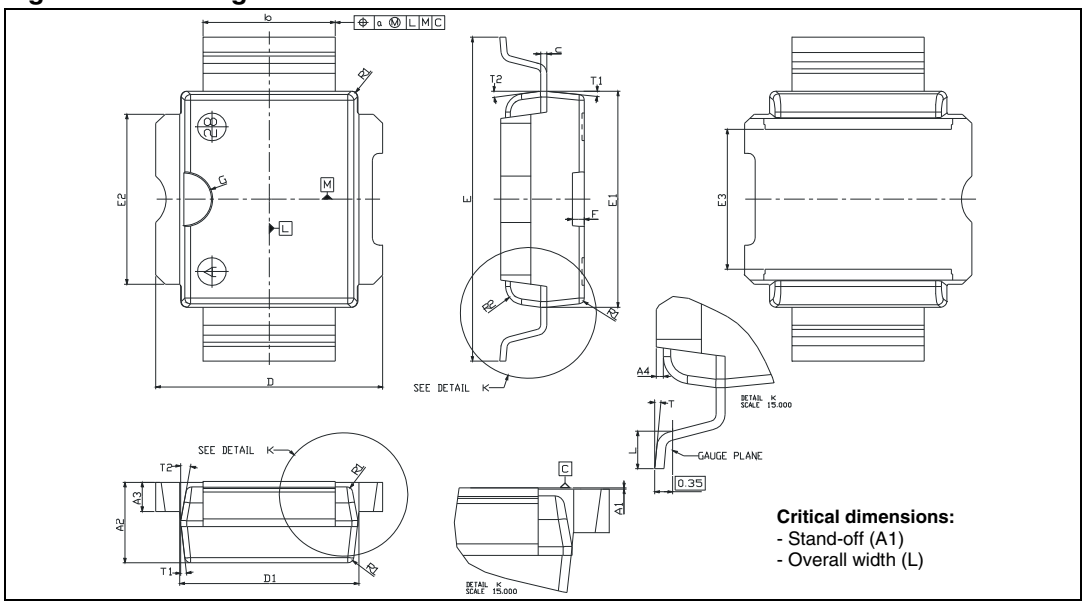


Table 10. PowerSO-10RF straight lead mechanical data

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	

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

Figure 14. Package dimensions

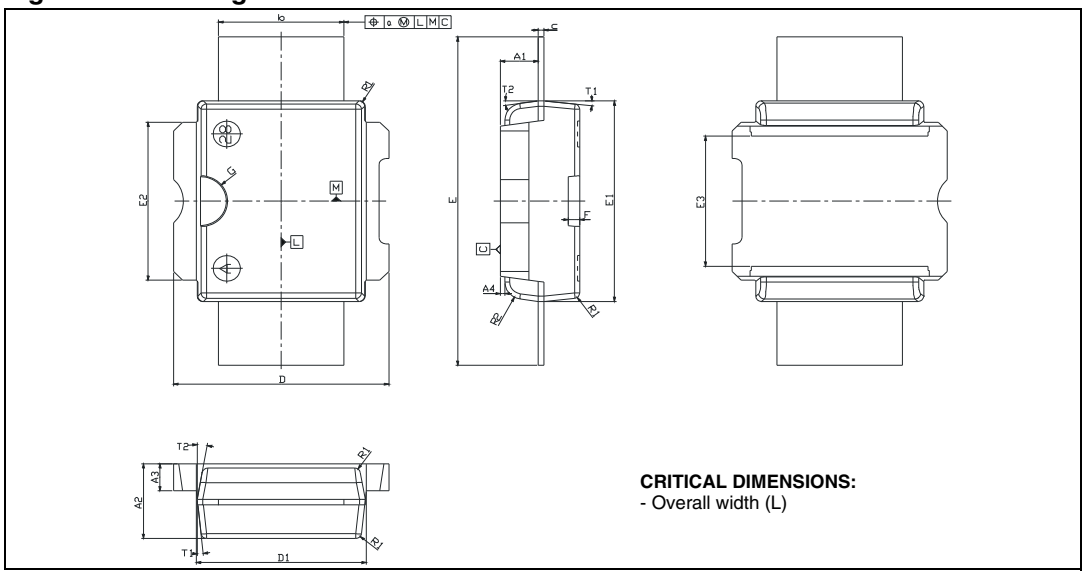


Figure 15. Tube information

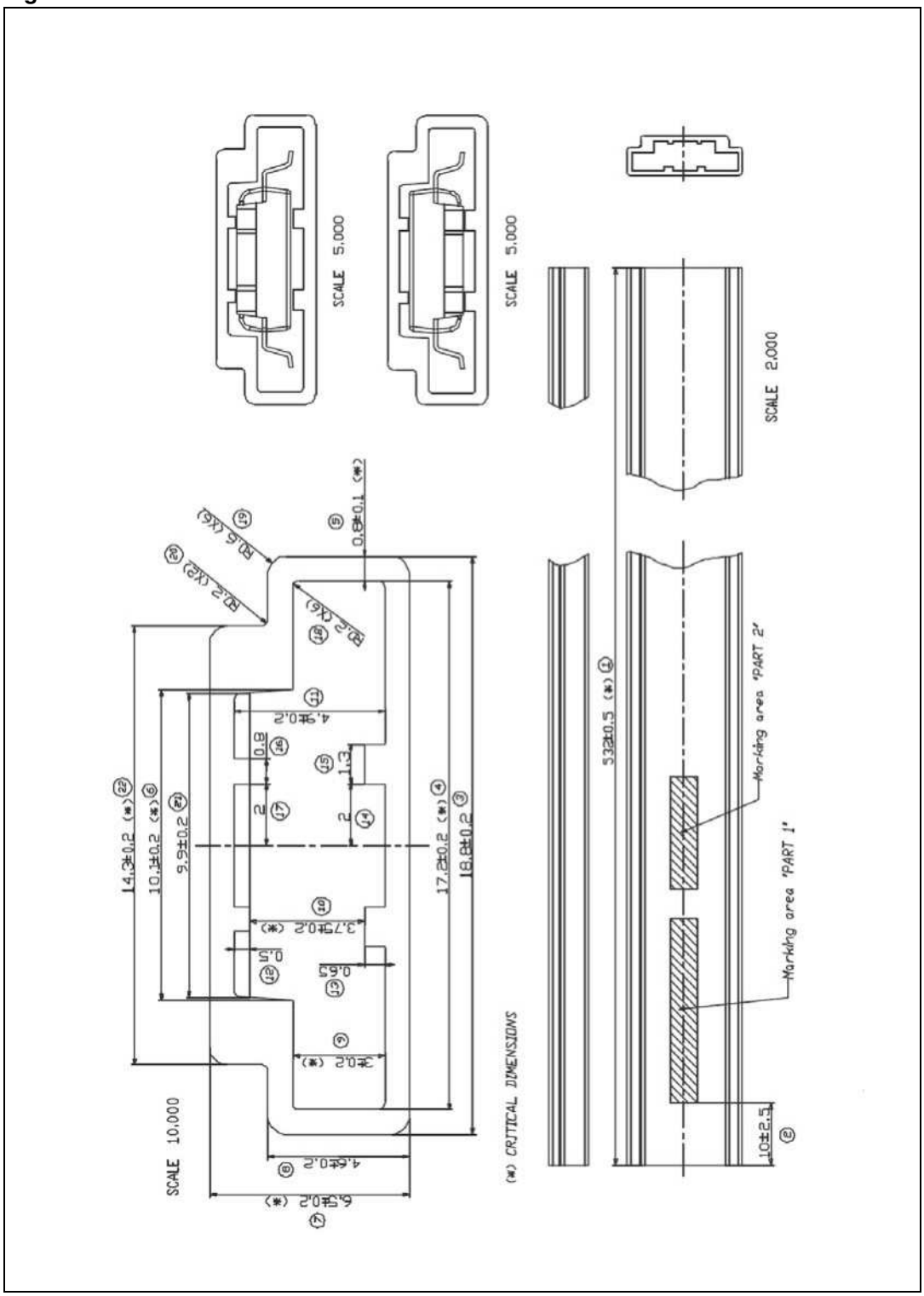
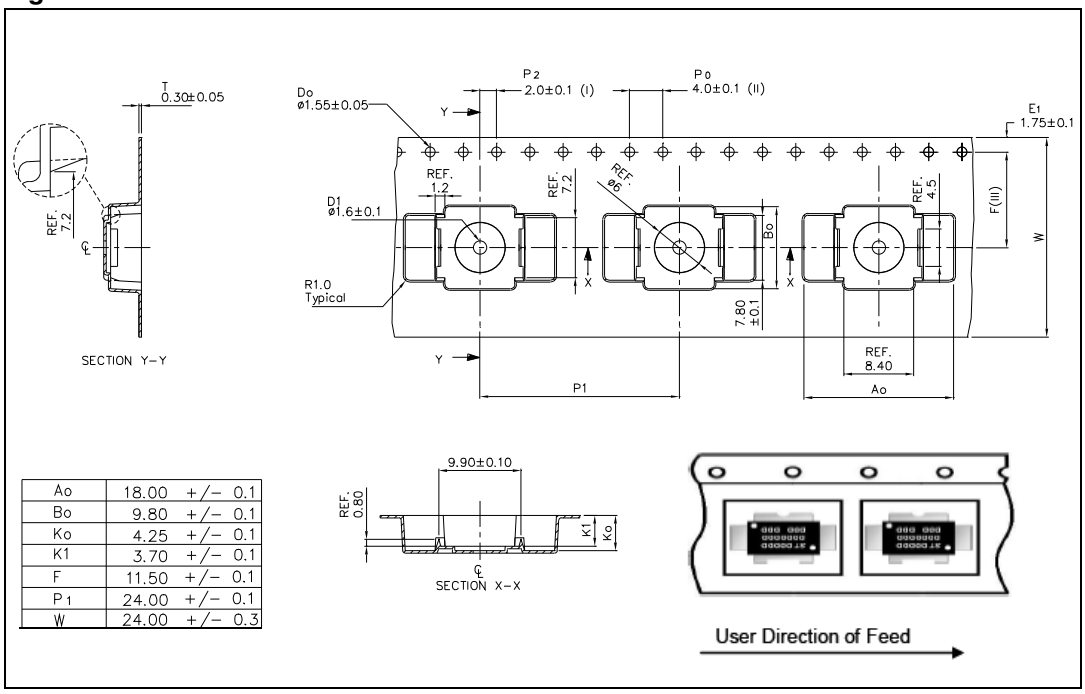


Figure 16. Reel information



Ao	18.00	+/−	0.1
Bo	9.80	+/−	0.1
Ko	4.25	+/−	0.1
K1	3.70	+/−	0.1
F	11.50	+/−	0.1
P1	24.00	+/−	0.1
W	24.00	+/−	0.3

6 Revision history

Table 11. Document revision history

Date	Revision	Changes
31-Jul-2007	1	Initial release.
04-May-2011	2	Updated *Table 4 on page 4* and *Figure 16: Reel information*.
07-Jun-2012	3	Removed commercial PD84010S-E and updated *Table 1: Device summary*.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2012 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com