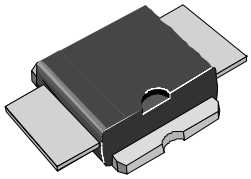
PD85050S

RF power transistor from the LdmoST family of N-channel enhancement-mode lateral MOSFETs

Datasheet –preliminary data

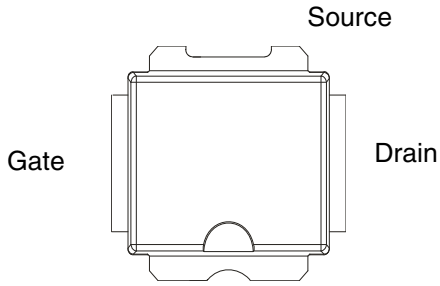
Features

- Operating frequencies from 1 MHz to 1000 MHz
- P_{OUT} > 50W with 12dB gain @ 870 MHz / 13.6V
- Unmatched device for wideband operation
- Bi-directional ESD
- Excellent Thermal stability
- High linearity for TETRA, DMR, SSB modulations
- Housed in PowerSO-10RF plastic package
- In compliance with the 2002/95/EC1 European directive



PowerSO-10RF (straight lead)

Figure 1. Pin connection



Description

The PD85050S 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 up to 1 GHz. The PD85050S boasts excellent gain, linearity and reliability thank to ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, the PowerSO-10RF. The superior linearity performance of the PD85050S makes it an ideal solution for car mobile radios. The PowerSO-10 plastic package is designed for high reliability, and is the first ST JEDEC-approved, high power SMD package from ST. It has been specially optimized for RF requirements and offers excellent RF performance and ease of assembly. Mounting recommendations are provided in application note AN1294, available on www.st.com.

Table 1. Device summary

Order codes	Package	Packing
PD85050S	PowerSO-10RF (straight lead)	Tube
PD85050STR		Tape and reel

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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	50	V
V_{GS}	Gate-source voltage	-10 /+15	V
P_{DISS}	Power dissipation (@ T_C = 70 °C)	105	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	0.9	°C/W

2 Electrical characteristics

T_{CASE} = +25 °C

2.1 Static

Table 4. Static

Symbol	Test conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	I_{DS} = 1 mA	50			V
I_{DSS}	V_{GS} = 0,V_{DS} = 28 V			1	µA
I_{GSS}	V_{GS} = 5 V, V_{DS} = 0			1	µA
V_P	I_D = 300 mA	2		4	V
$V_{DS(ON)}$	V_{GS} = 10 V, I_{DS} = 3 A			0.35	V
G_{FS}	V_{GS} = 10 V, I_{DS} = 8 A		8		S
C_{ISS}	V_{GS} = 0, V_{DS} = 12 V, f = 1 MHz		110		pF
C_{OSS}	V_{GS} = 0, V_{DS} = 12 V, f = 1 MHz		70		pF
C_{RSS}	V_{GS} = 0, V_{DS} = 12 V, f = 1 MHz		3.6		pF

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min	Typ	Max	Unit
P_{OUT}	V_{DD} = 13.6 V, I_{DQ} = 500 mA, P_{IN} = 4 W	50	55	-	W
G_P	V_{DD} = 13.6 V, I_{DQ} = 500 mA, P_{OUT} = 50 W	10	12	-	dB
h_D	V_{DD} = 13.6 V, I_{DQ} = 500 mA, P_{IN} = 4 W	55	60	-	%
Load mismatch	V_{DD} = 17 V, I_{DQ} = 500 mA, P_{OUT} = 60 W		65:1	-	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

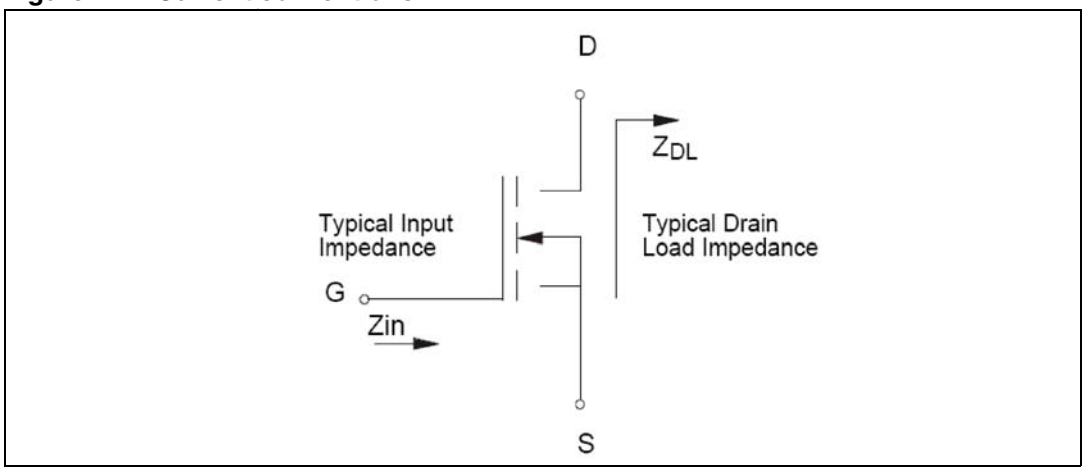


Table 8. Impedance data from 100 MHz to 180 MHz(1)

Frequency (MHz)	Z_{IN} (Ω)	Z_{DL}(Ω)
100	4.194 - j12.817	1.118 - j0.137
120	3.122 - j10.860	1.118 - j0.164
140	2.461 - j9.370	1.117 - j0.191
160	2.028 - j8.202	1.116 - j0.219
180	1.733 - j7.264	1.115 - j0.246

1. Z_{IN} includes a 50 Ω gate-source resistor.

Table 9. Impedance data from 300 MHz to 520 MHz

Frequency (MHz)	Z_{IN} (Ω)	Z_{DL}(Ω)
300	0.292 - j4.371	1.106 - j0.413
320	0.304 - j4.022	1.104 - j0.441
340	0.316 - j3.711	1.102 - j0.470
360	0.329 - j3.432	1.100 - j0.498
380	0.343 - j3.177	1.097 - j0.526
400	0.356 - j2.943	1.095 - j0.555
420	0.371 - j2.728	1.093 - j0.583
440	0.388 - j2.531	1.090 - j0.612
460	0.404 - j2.348	1.087 - j0.641
480	0.421 - j2.180	1.085 - 0.670
500	0.437 - j2.025	1.082 - j0.700
520	0.451 - j1.880	1.079 - j0.729

Table 10. Impedance data from 740 MHz to 960 MHz

Frequency (MHz)	Z_{IN} (Ω)	Z_{DL}(Ω)
740	0.392 - j0.618	1.042 - j1.064
760	0.406 - j0.532	1.038 - j1.096
780	0.421 - j0.447	1.034 - j1.128
800	0.436 - j0.363	1.030 - j1.160
820	0.452 - j0.283	1.026 - j1.192
840	0.467 - j0.205	1.022 - j1.225
860	0.482 - j0.130	1.018 - j1.258
880	0.497 - j0.056	1.014 - j1.291
900	0.513 + j0.016	1.010 - j1.324
920	0.528 +j0.086	1.006 - j1.357
940	0.544 + j0.154	1.002 - j1.391
960	0.558 + j0.220	0.998 - j1.425

4 Typical performance

Figure 3. Capacitance vs. voltage

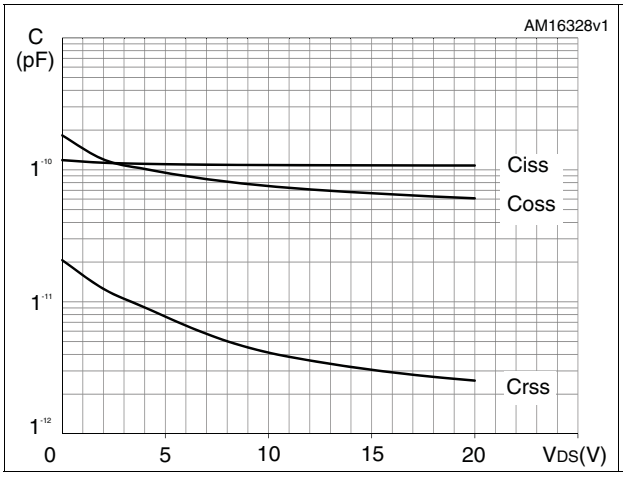


Figure 4. DC output characteristics

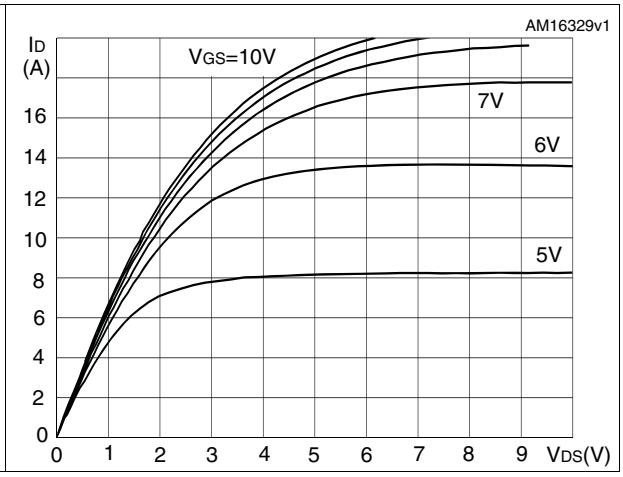


Figure 5. Gain and efficiency vs P_{OUT} - saturated power loadline

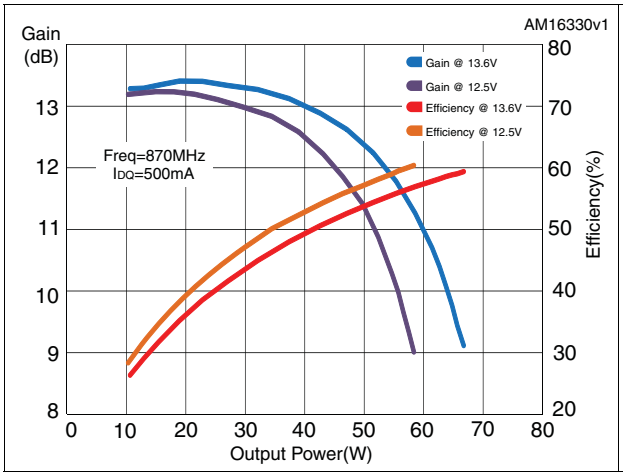


Figure 6. Gain and efficiency vs P_{OUT} - high efficiency 50 W loadline @ 13.6 V

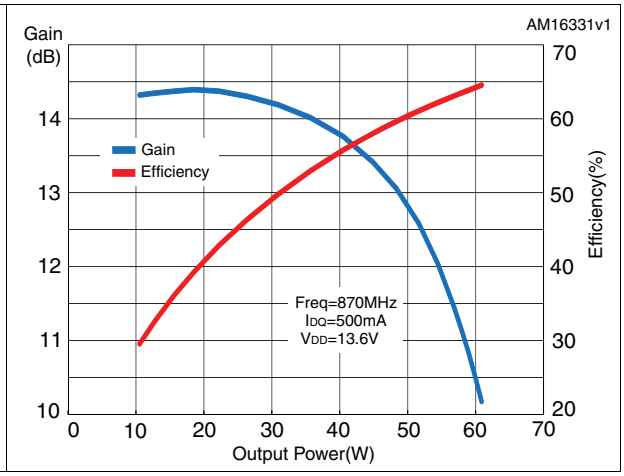


Figure 7. Gain and efficiency vs P_{OUT} - 30 W P1dB loadline @13.6 V

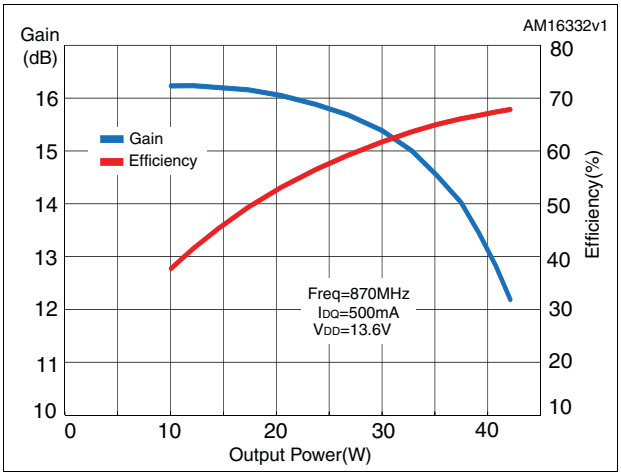


Figure 8. Transient thermal impedance

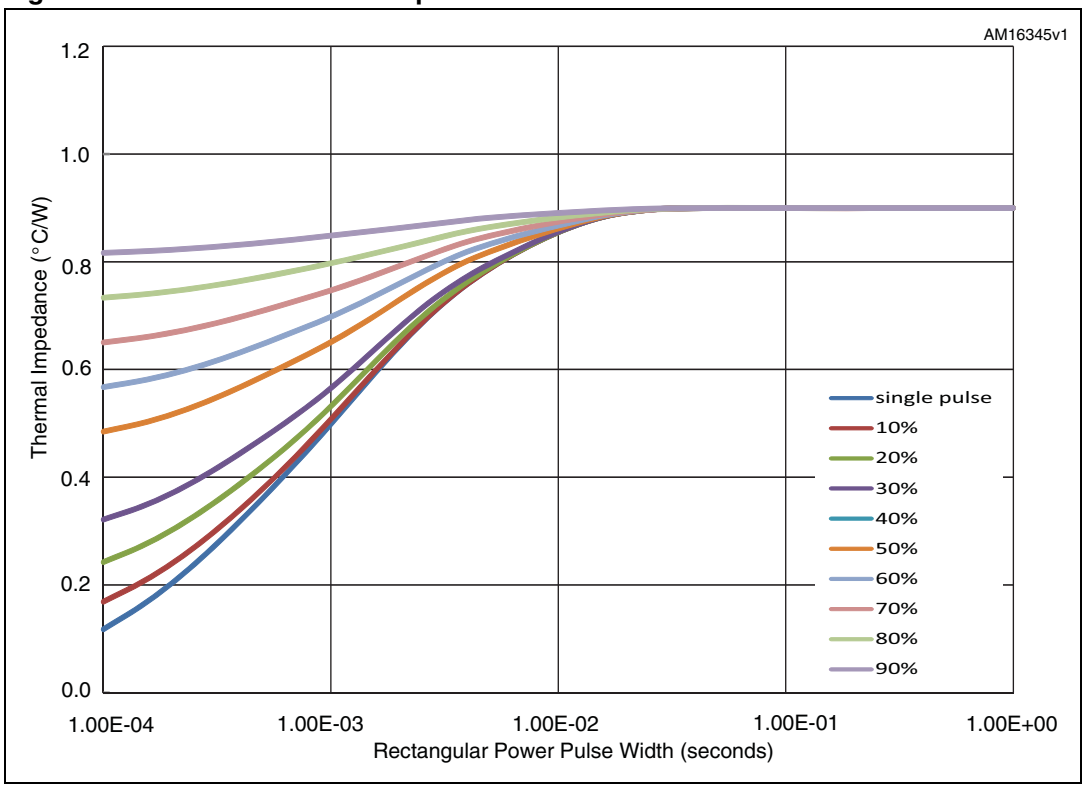
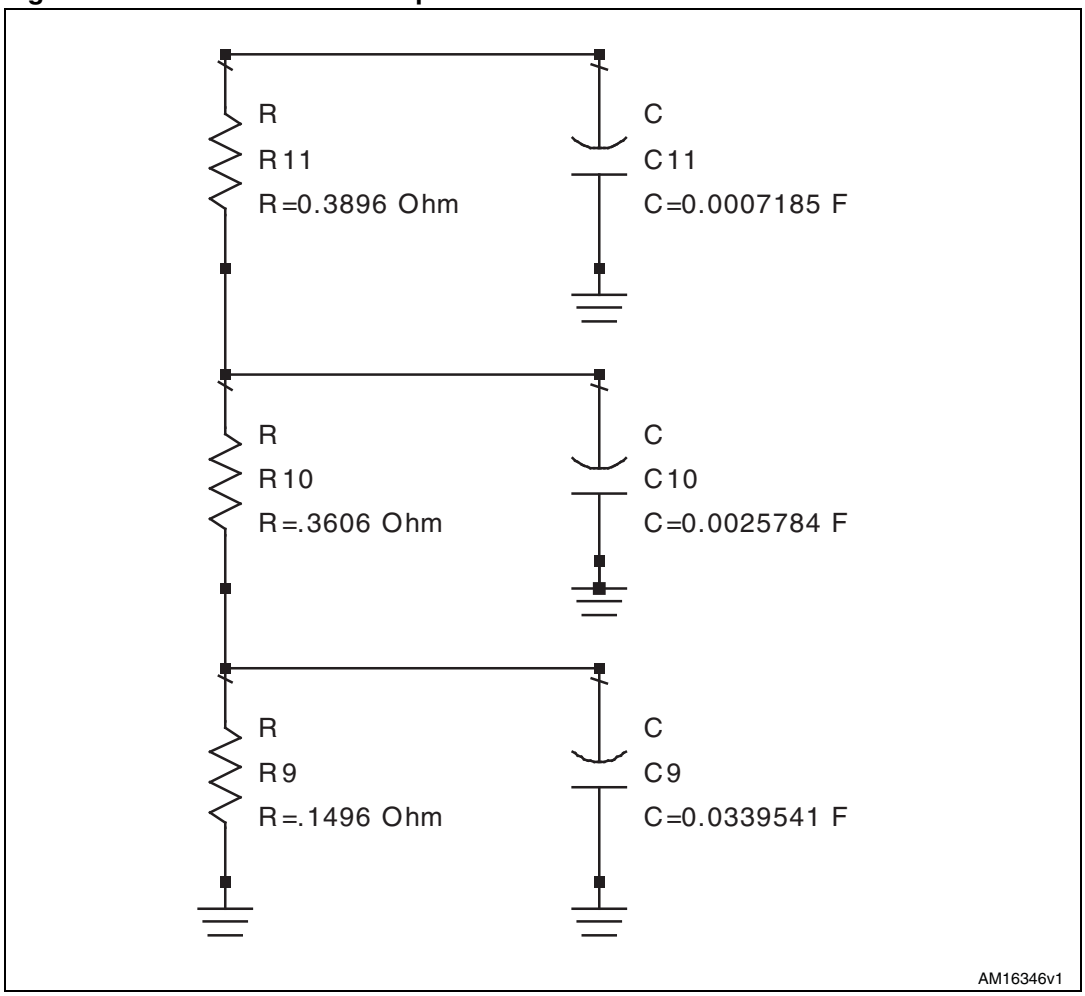


Figure 9. Transient thermal impedance model



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 11. 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 10. Package dimensions

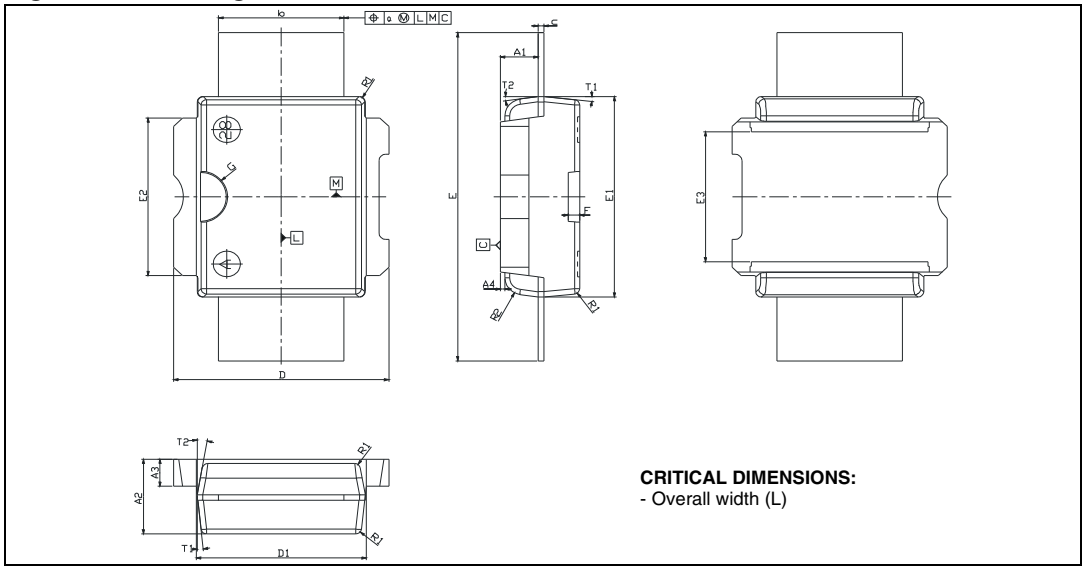


Figure 11. Tube information

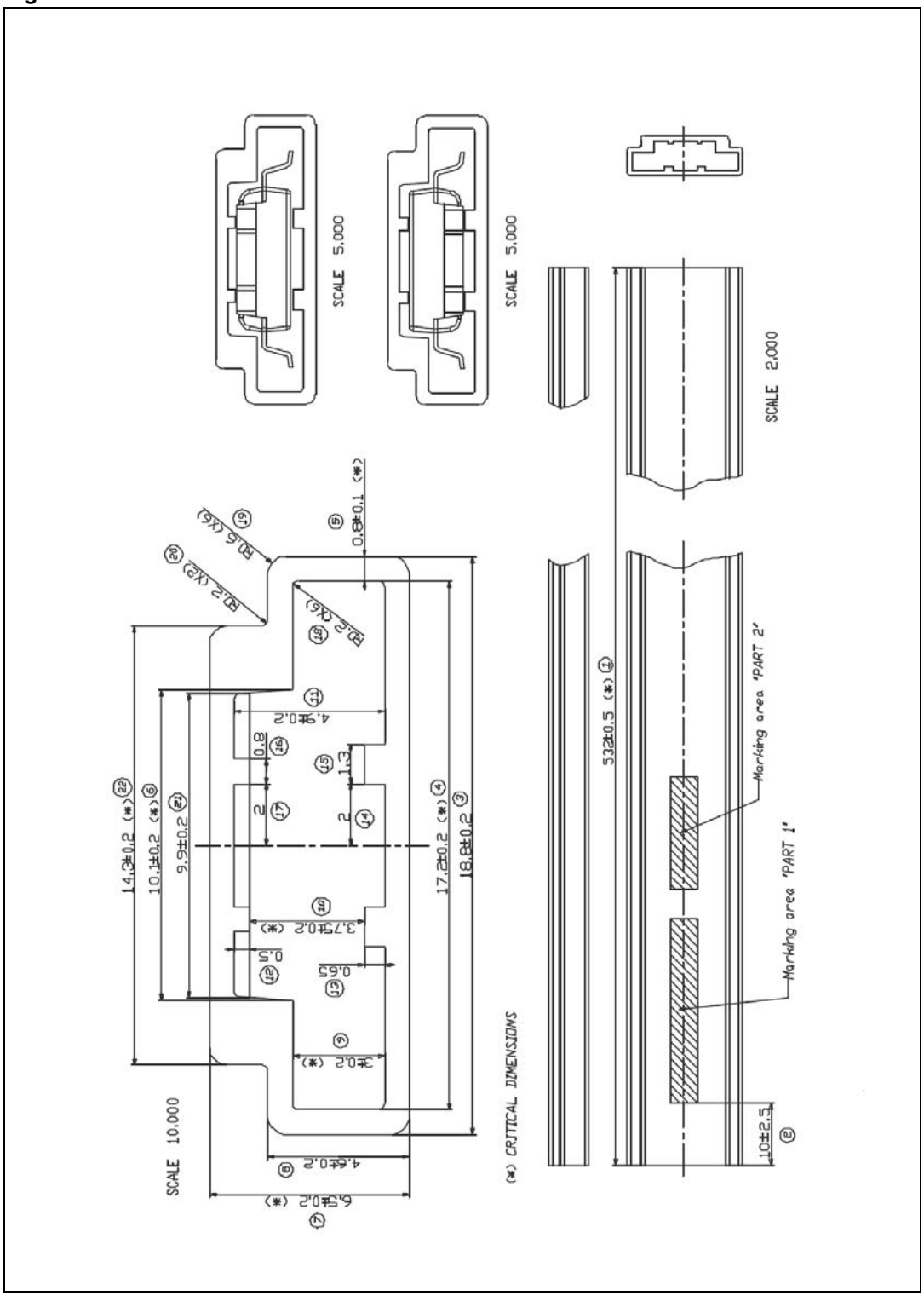
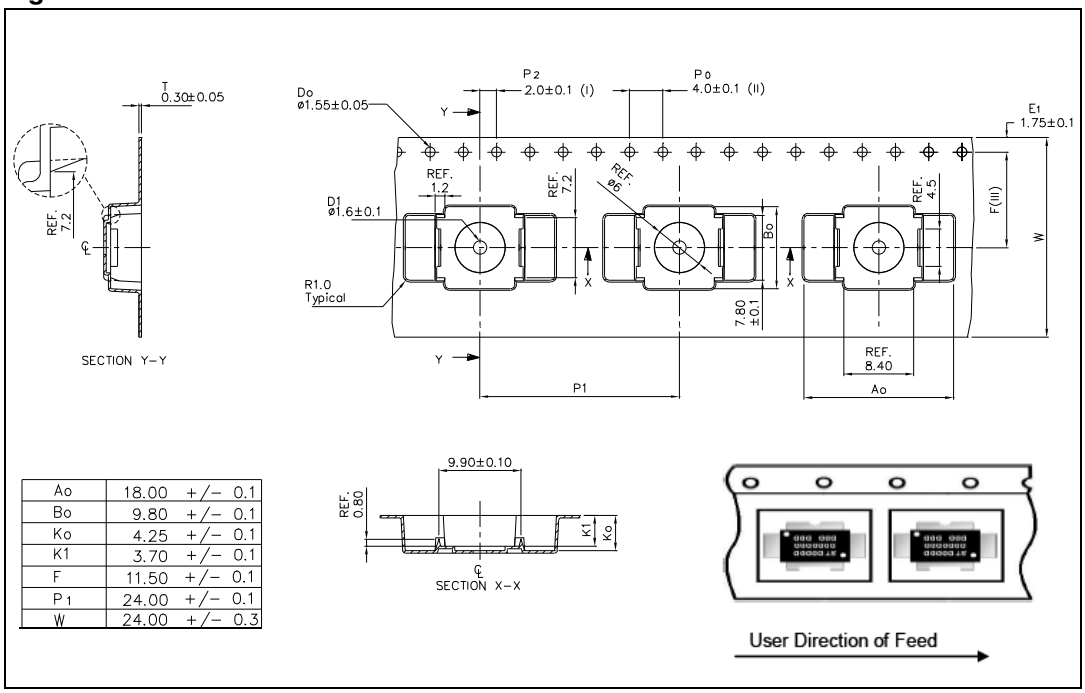


Figure 12. Reel information



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 12. Document revision history

Date	Revision	Changes
30-Nov-2012	1	Initial release.

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