



# PD84010-E PD84010S-E

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

### Features

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

### 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 7.5V 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. Mounting recommendations are available in [www.st.com/rf/](http://www.st.com/rf/) (look for application note AN1294)

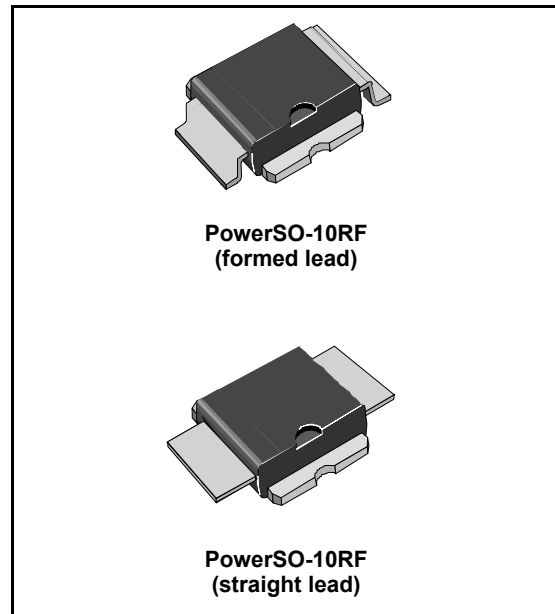


Figure 1. Pin connection

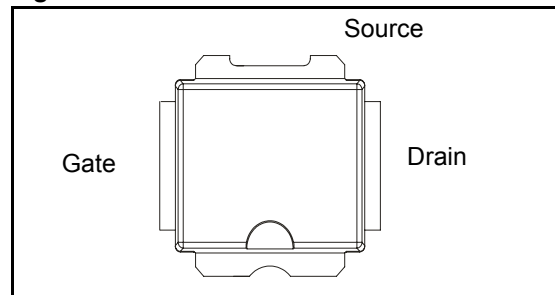


Table 1. Device summary

Order codes	Package	Packing
PD84010-E	PowerSO-10RF (formed lead)	Tube
PD84010S-E	PowerSO-10RF (straight lead)	Tube
PD84010TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD84010STR-E	PowerSO-10RF (straight lead)	Tape and reel

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# Contents

<b>1</b>	<b>Electrical data</b> .....	<b>3</b>
	1.1 Maximum ratings .....	3
	1.2 Thermal data .....	3
<b>2</b>	<b>Electrical characteristics</b> .....	<b>4</b>
	2.1 Static .....	4
	2.2 Dynamic .....	4
	2.3 ESD protection characteristics .....	4
	2.4 Moisture sensitivity level .....	4
<b>3</b>	<b>Impedance</b> .....	<b>5</b>
<b>4</b>	<b>Typical performance</b> .....	<b>6</b>
<b>5</b>	<b>Package mechanical data</b> .....	<b>8</b>
<b>6</b>	<b>Revision history</b> .....	<b>13</b>

# 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	40	V
$V_{GS}$	Gate-source voltage	-0.5 to +15	V
$I_D$	Drain current	8	A
$P_{DISS}$	Power dissipation (@ $T_C = 70^{\circ}C$ )	95	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	1.0	$^{\circ}C/W$

## 2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

### 2.1 Static

**Table 4. Static**

Symbol	Test conditions			Min	Typ	Max	Unit
$I_{\text{DSS}}$	$V_{\text{GS}} = 0\text{V}$	$V_{\text{DS}} = 25\text{V}$				1	$\mu\text{A}$
$I_{\text{GSS}}$	$V_{\text{GS}} = 5\text{V}$	$V_{\text{DS}} = 0\text{V}$				1	$\mu\text{A}$
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 10\text{V}$	$I_{\text{D}} = \text{TBDmA}$			TBD		V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{V}$	$I_{\text{D}} = 3\text{A}$			0.64	0.7	V
$C_{\text{ISS}}$	$V_{\text{GS}} = 0\text{V}$	$V_{\text{DS}} = 7\text{V}$	$f = 1\text{MHz}$		77		pF
$C_{\text{OSS}}$	$V_{\text{GS}} = 0\text{V}$	$V_{\text{DS}} = 7\text{V}$	$f = 1\text{MHz}$		54		pF
$C_{\text{RSS}}$	$V_{\text{GS}} = 0\text{V}$	$V_{\text{DS}} = 7\text{V}$	$f = 1\text{MHz}$		2.3		pF

### 2.2 Dynamic

**Table 5. Dynamic**

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

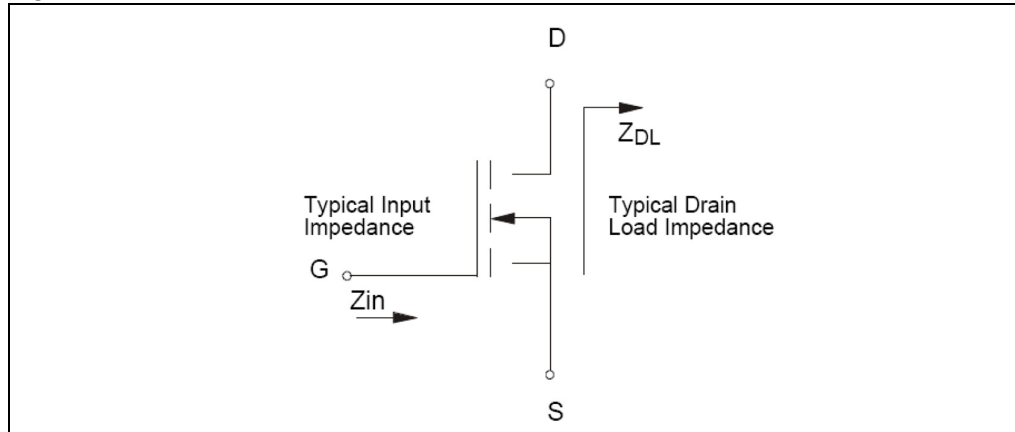


Table 8. Impedance data

Freq. (MHz)	$Z_{IN} (\Omega)$	$Z_{DL} (\Omega)$
870 MHz	$0.35 + j 1.1$	$1.53 - j 0.23$

## 4 Typical performance

Figure 3. Threshold voltage

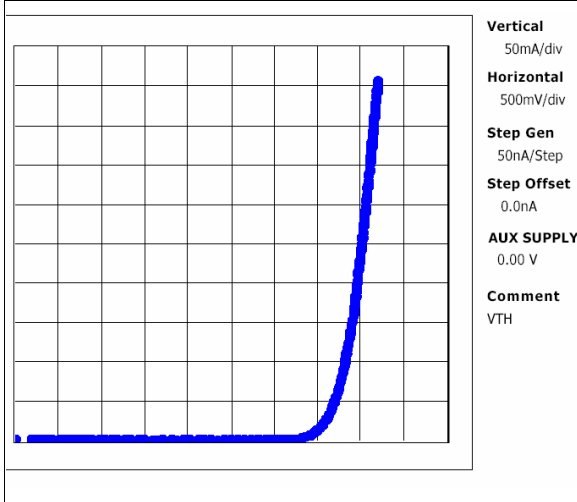


Figure 4. DC output characteristic

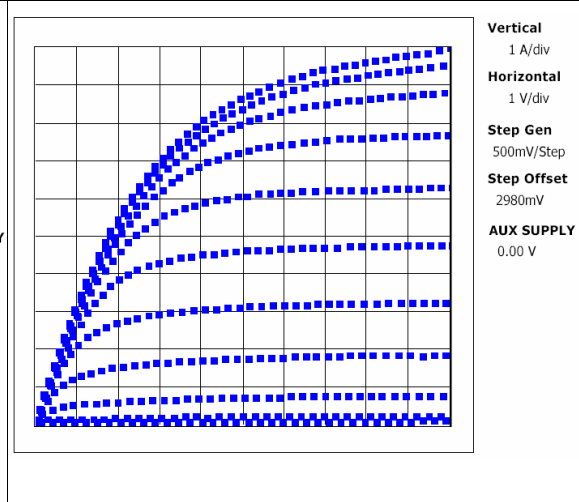


Figure 5. ID vs VGS

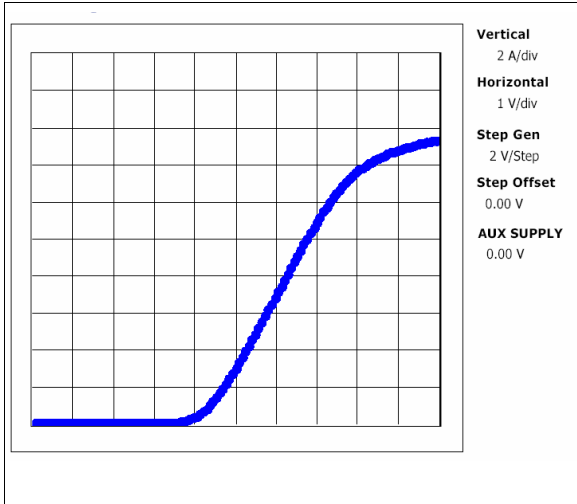


Figure 6. Capacitances vs voltage

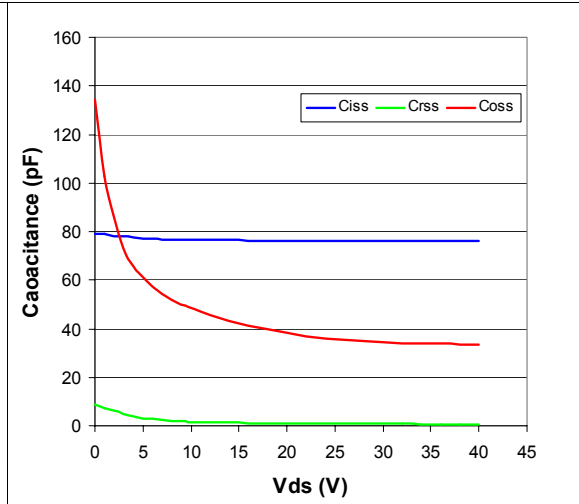


Figure 7. Pout & Id vs V<sub>GS</sub>

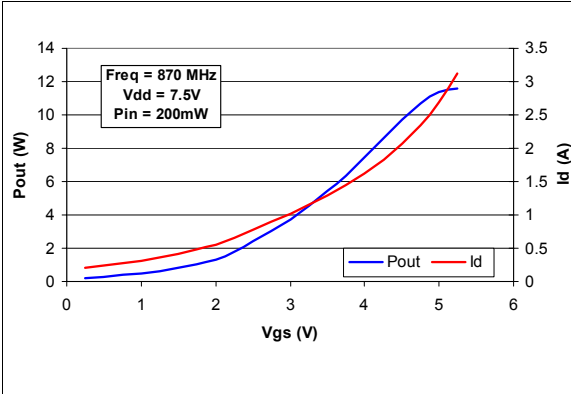


Figure 8. Pout & Id vs supply voltage

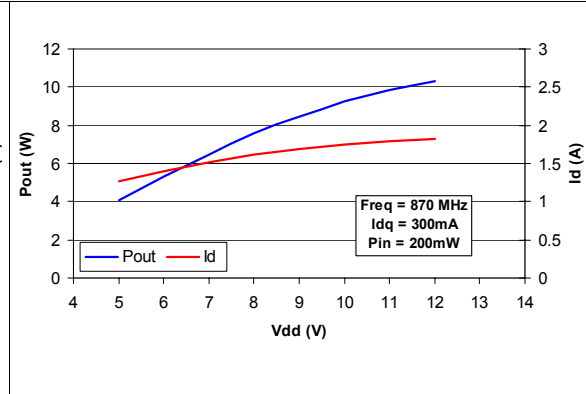


Figure 9. Pout & id vs supply voltage

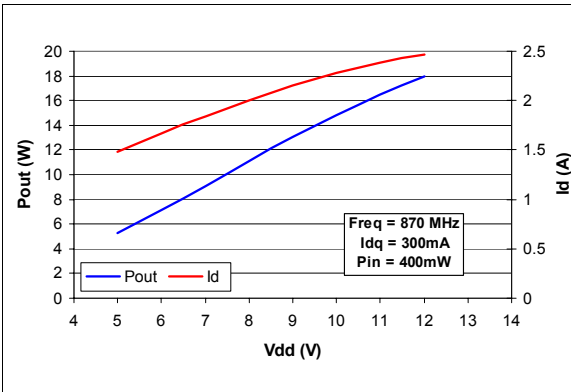


Figure 10. Pout & id vs supply voltage

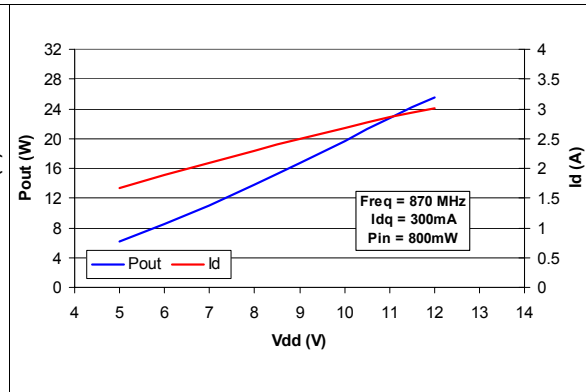


Figure 11. Gain vs Pout & Bias current

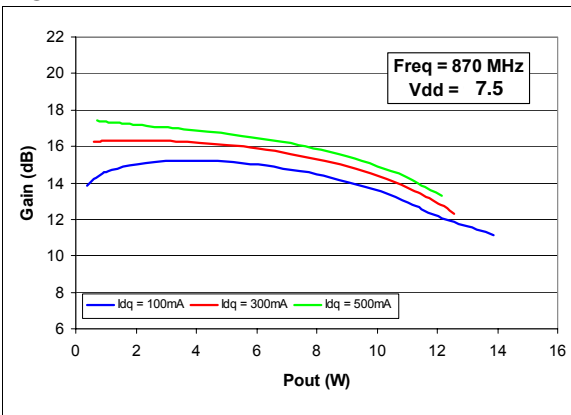
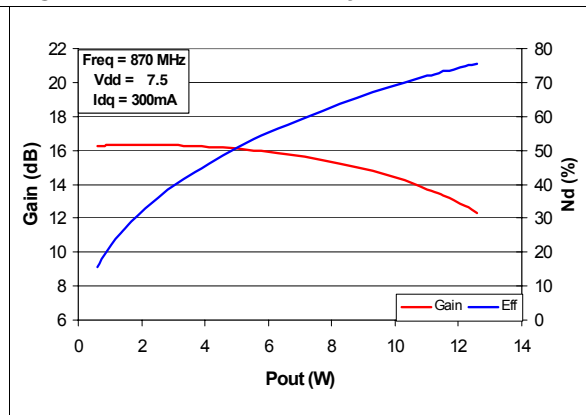


Figure 12. Gain & efficiency vs Pout



## 5 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com)

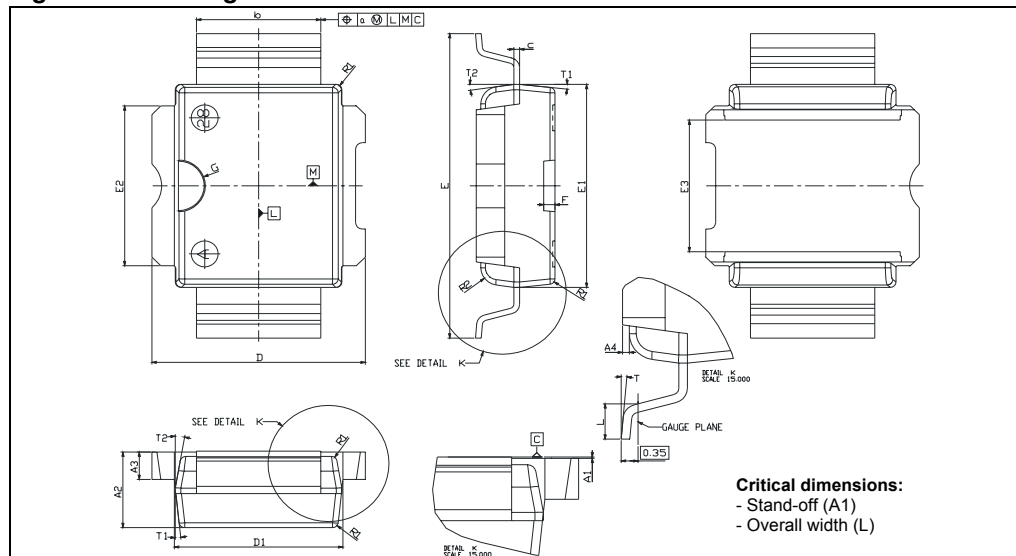


**Table 9. PowerSO-10RF formed lead (Gull Wing) mechanical data**

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**

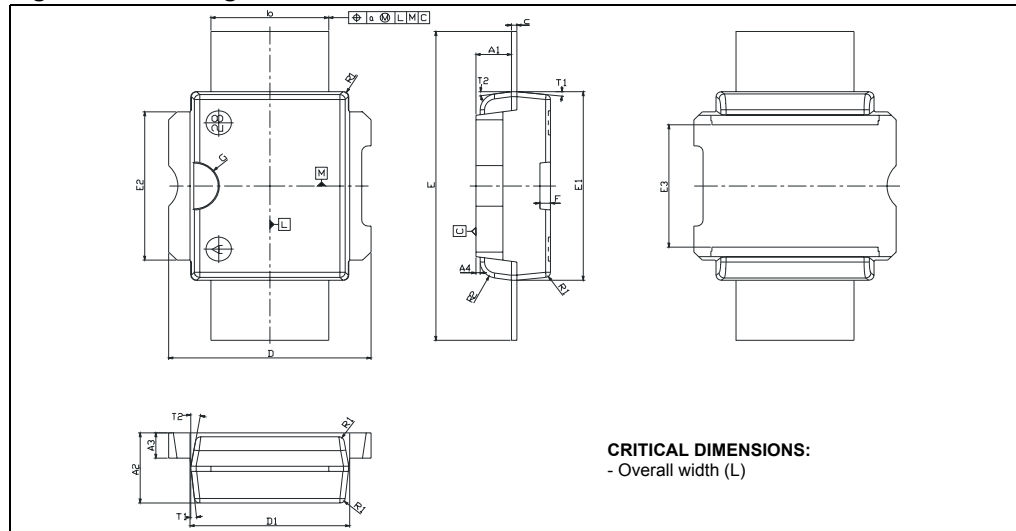


Figure 15. Tube information

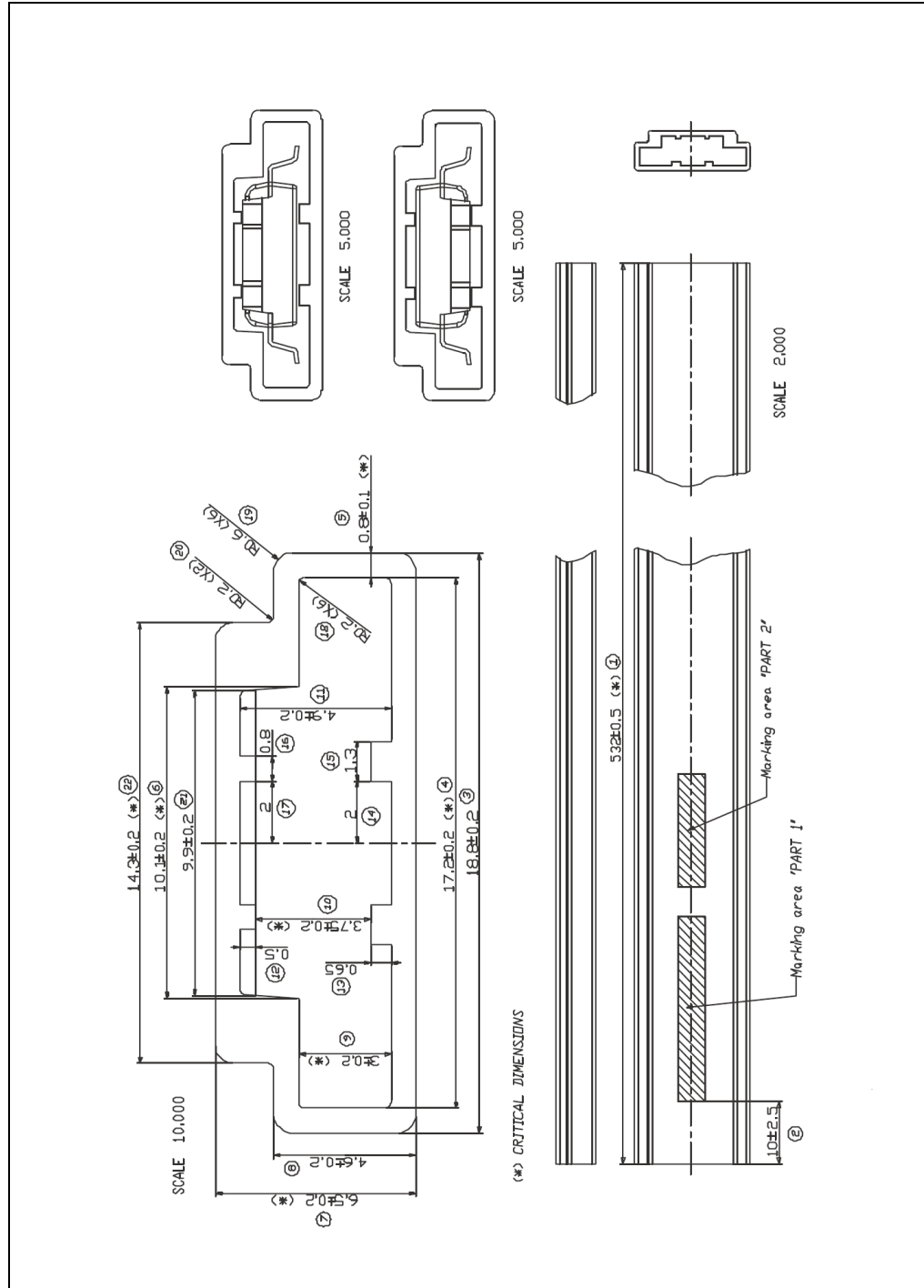
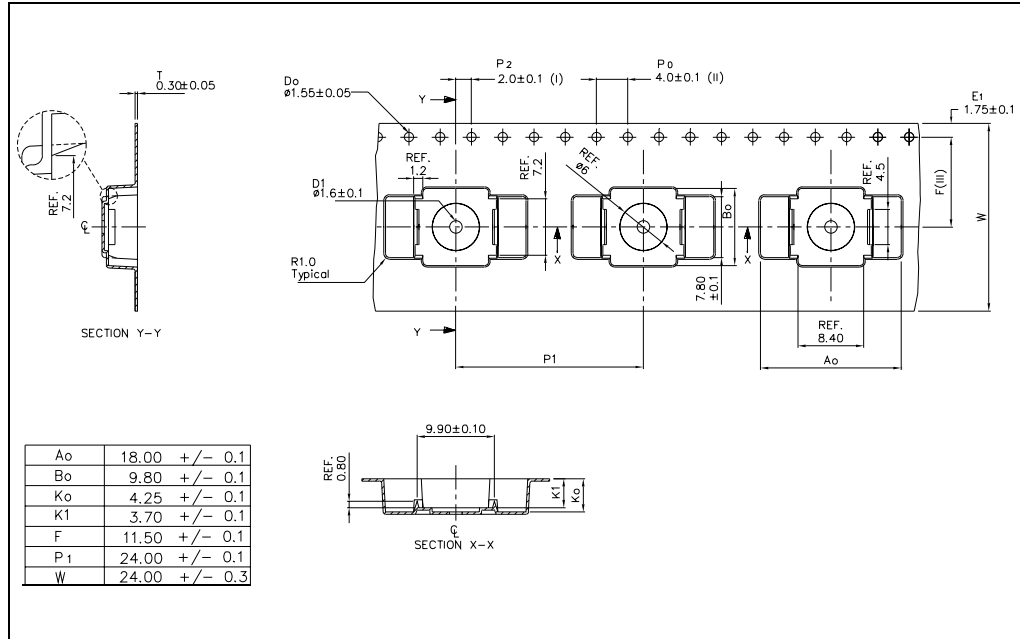


Figure 16. Reel information



## 6 Revision history

**Table 11. Document revision history**

Date	Revision	Changes
31-Jul-2007	1	Initial release

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