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## PD57030-E

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

#### Features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 30\text{ W}$  with 14dB gain @ 945 MHz / 28 V
- New RF plastic package

#### Description

The device is a common source N-channel, enhancement-mode lateral field-effect RF power transistor. It is designed for high gain, broad band commercial and industrial applications. It operates at 28 V in common source mode at frequencies up to 1 GHz. The device 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. Device's superior linearity performance makes it an ideal solution for base station 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 performance and ease of assembly. Mounting recommendations are available in [www.st.com/rf/](http://www.st.com/rf/) (look for application note AN1294)

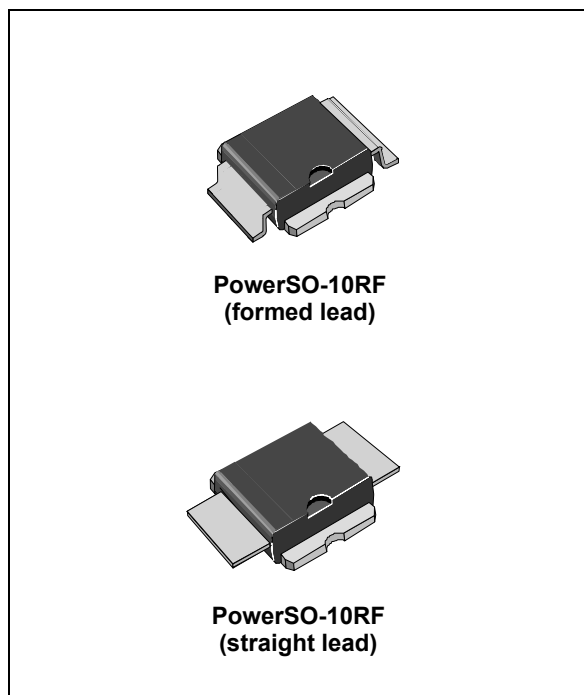


Figure 1. Pin connection

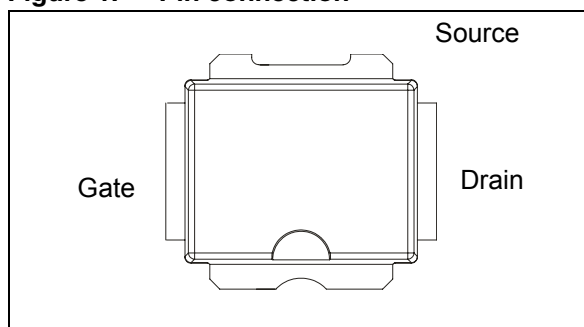


Table 1. Device summary

Order code	Package	Packing
PD57030-E	PowerSO-10RF (formed lead)	Tube
PD57030S-E	PowerSO-10RF (straight lead)	Tube
PD57030TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD57030STR-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	65	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D$	Drain current	4	A
$P_{DISS}$	Power dissipation (@ $T_C = 70^{\circ}C$ )	52.8	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	1.8	$^{\circ}C/W$

## 2 Electrical characteristics

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

### 2.1 Static

**Table 4. Static**

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(BR)DSS}$	$V_{GS} = 0$	$I_{DS} = 10\text{mA}$	65			V
$I_{DSS}$	$V_{GS} = 0$	$V_{DS} = 28\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	$V_{GS} = 20\text{ V}$	$V_{DS} = 0$			1	$\mu\text{A}$
$V_{GS(Q)}$	$V_{DS} = 28\text{ V}$	$I_D = 50\text{ mA}$	2.0		5.0	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 3\text{ A}$		1.3		V
$g_{FS}$	$V_{DS} = 10\text{ V}$	$I_D = 3\text{ A}$		1.8		mho
$C_{ISS}$	$V_{GS} = 0$	$V_{DS} = 28\text{ V}$		57		pF
$C_{OSS}$	$V_{GS} = 0$	$V_{DS} = 28\text{ V}$		30		pF
$C_{RSS}$	$V_{GS} = 0$	$V_{DS} = 28\text{V}$		2.3		pF

### 2.2 Dynamic

**Table 5. Dynamic**

Symbol	Test conditions		Min	Typ	Max	Unit
$P_{OUT}$	$V_{DS} = 28\text{ V}$	$I_{DQ} = 50\text{ mA}$ $f = 945\text{ MHz}$	30			W
$G_P$	$V_{DS} = 28\text{ V}$	$I_{DQ} = 50\text{ mA}$ $P_{OUT} = 30\text{ W}$ $f = 945\text{ MHz}$	13	14		dB
$\eta_D$	$V_{DS} = 28\text{ V}$	$I_{DQ} = 50\text{ mA}$ $P_{OUT} = 30\text{ W}$ $f = 945\text{ MHz}$	45	53		%
Load mismatch	$V_{DS} = 28\text{ V}$	$I_{DQ} = 50\text{ mA}$ $P_{OUT} = 30\text{ W}$ $f = 945\text{ MHz}$ all phase angles	10:1			VSWR

### 2.3 Moisture sensitivity level

**Table 6. Moisture sensitivity level**

Test methodology	Rating
J-STD-020B	MSL 3

### 3 Impedance

Figure 2. Current conventions

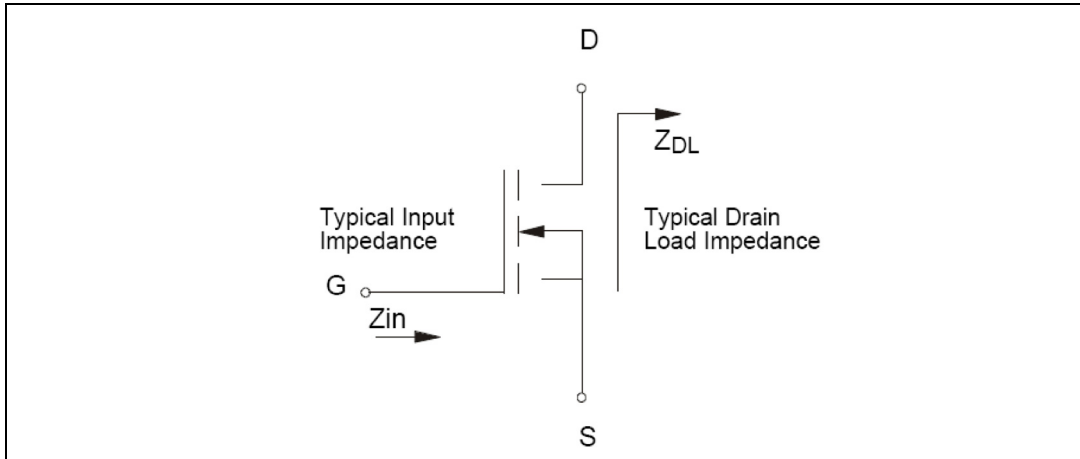


Table 7. Impedance data

Freq. (MHz)	$Z_{IN} (\Omega)$	$Z_{DL}(\Omega)$
925	$0.929 - j 0.315$	$2.60 + j 1.45$
945	$0.809 - j 0.085$	$2.46 + j 0.492$
960	$0.763 - j 0.428$	$2.35 + j 0.591$

# 4 Typical performance

Figure 3. Capacitance vs supply voltage

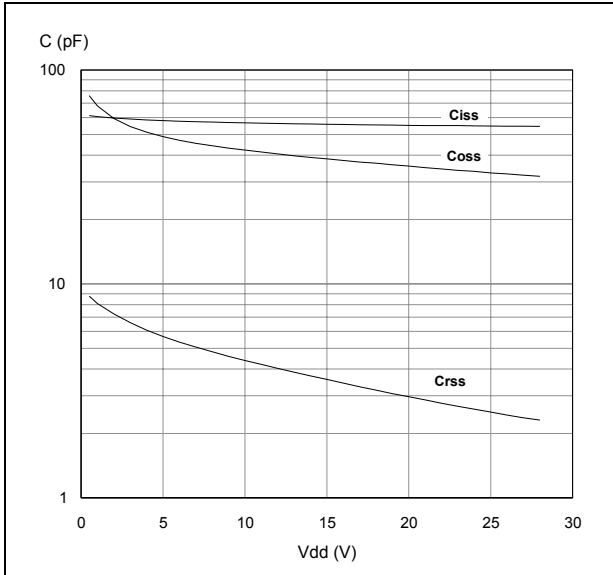
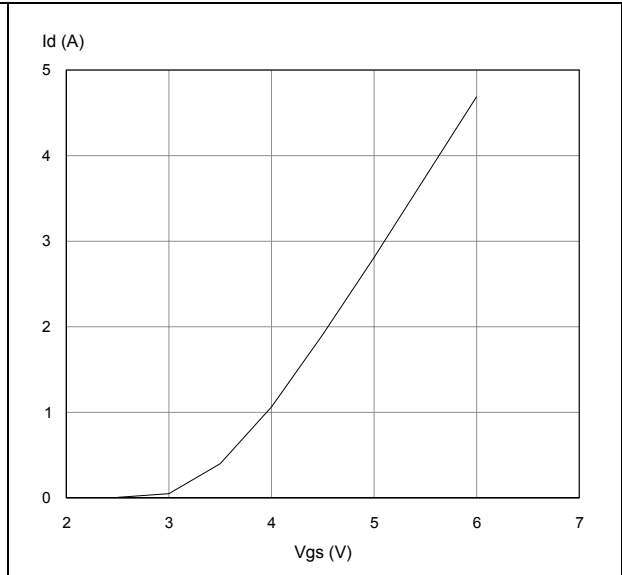
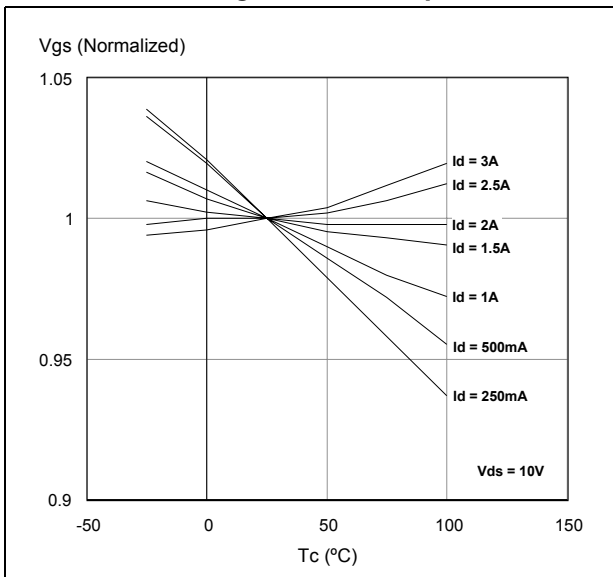


Figure 4. Drain current vs gate source voltage

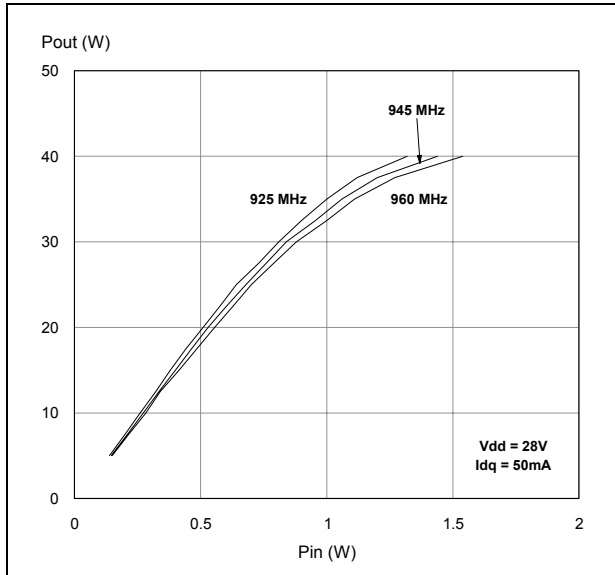


Gate-source voltage vs case temperature

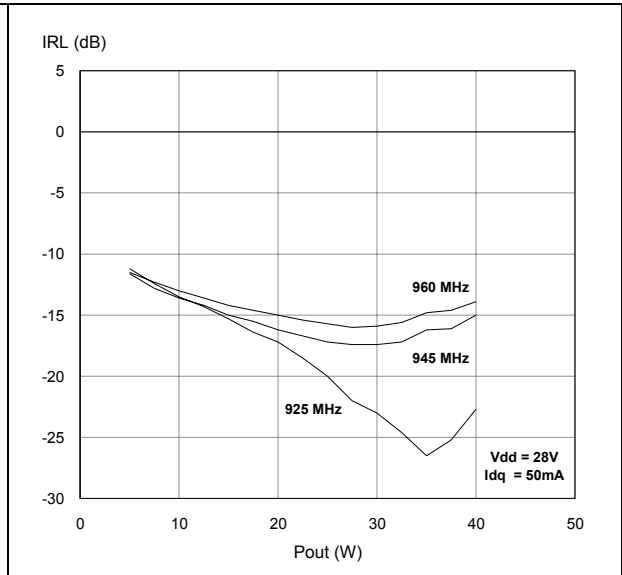


### 4.1 PD57030S-E

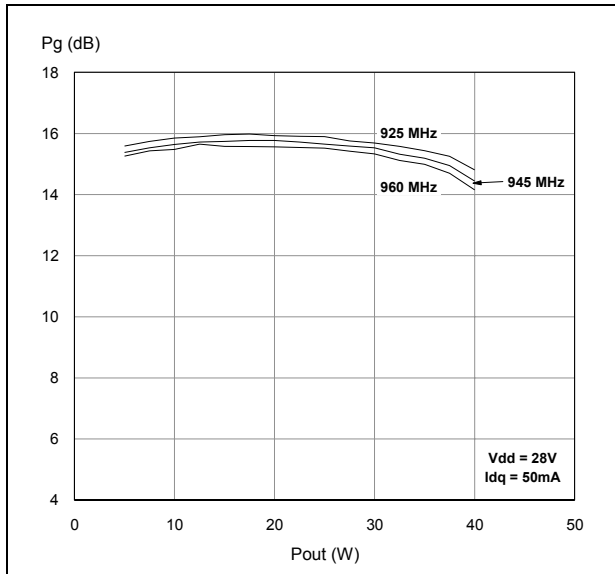
**Figure 5. Output power vs input power**



**Figure 6. Input return loss vs output power**



**Figure 7. Power gain vs output power**



**Figure 8. Efficiency vs output power**

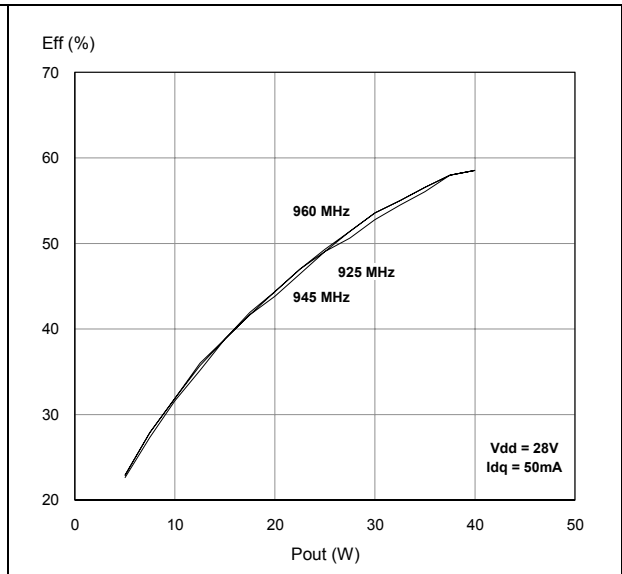




Figure 9. Output power vs bias current

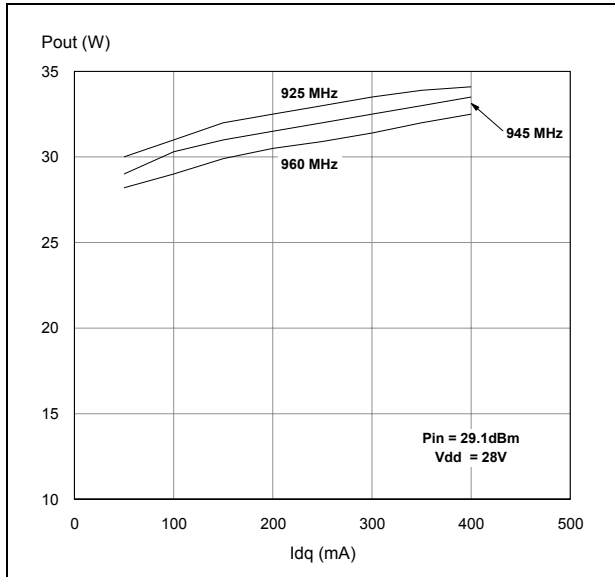


Figure 10. Efficiency vs bias current

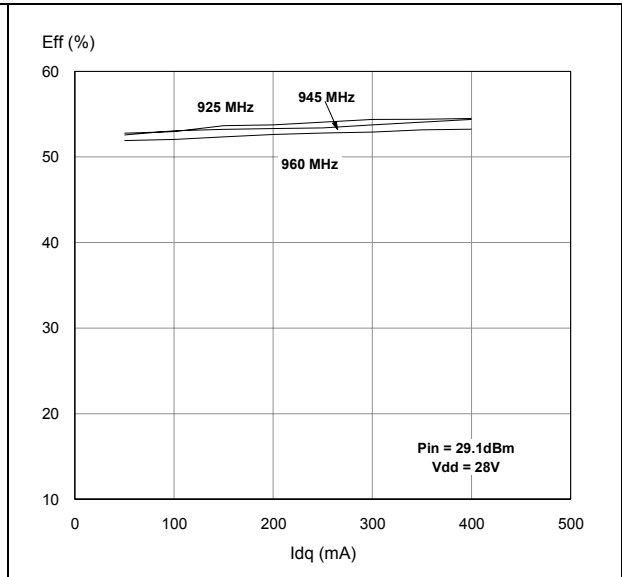


Figure 11. Output power vs drain voltage

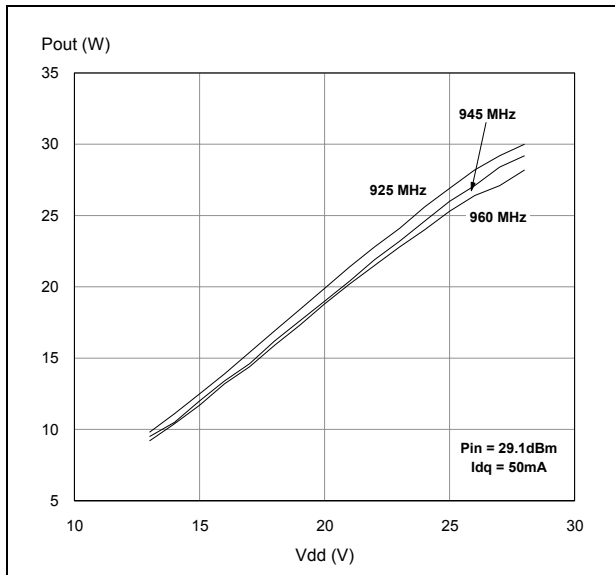


Figure 12. Efficiency vs drain voltage

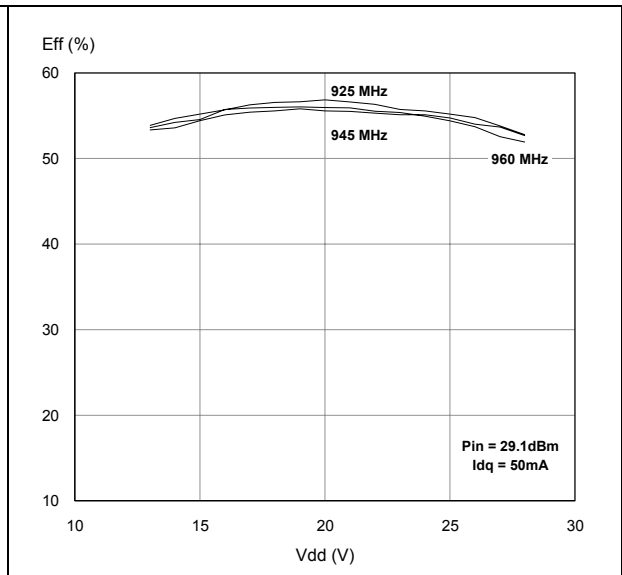
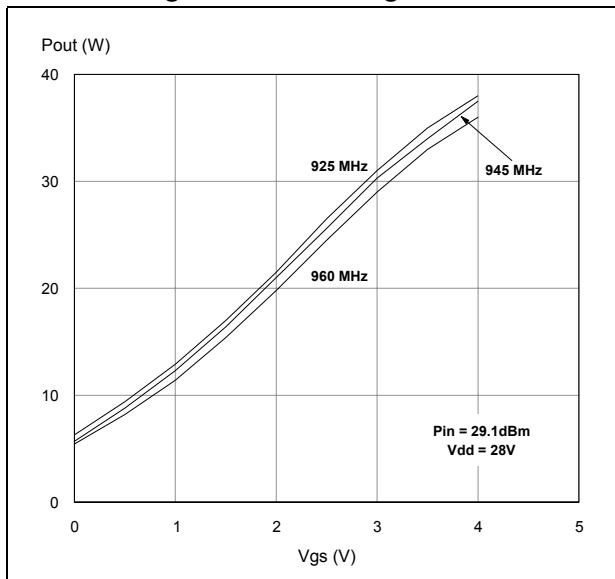


Figure 13. Output power vs gate-source voltage



# 5 Test circuit

Figure 14. Test circuit schematic

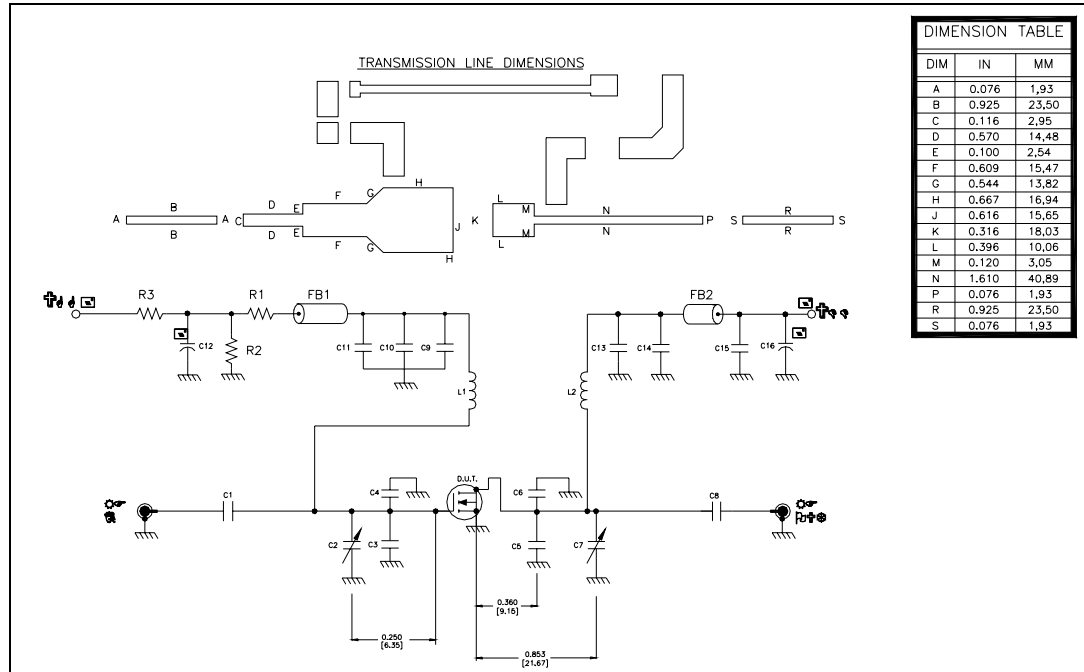


Table 8. Test circuit component part list

Component	Description
C1, C8, C9, C13	47 pF ATC 100B Surface mount ceramic chip capacitor
C2, C7	0.8-8.0 pF Giga trim variable capacitor
C3, C4, C5, C6	7.5 pF ATC 100B surface mount ceramic chip capacitor
C10	1000 pF ATC 100B surface mount ceramic chip capacitor
C11, C15	0.1 μF / 500 V surface mount ceramic chip capacitor
C12	10 μF / 50 V aluminum electrolytic radial lead capacitor
C14	100 pF ATC 100B surface mount ceramic chip capacitor
C16	220 μF / 63 V aluminum electrolytic radial lead capacitor
R1	18 kΩ, 1 W surface mount chip resistor
R2	4.7 MΩ, 1 W surface mount chip resistor
R3	120 Ω, 2 W surface mount chip resistor
FB1, FB2	Shield bead surface mount EMI
L1, L2	Inductor, 5 turns air wound #22AWG, ID=0.059[1.49], nylon coated magnet wire

Figure 15. Test circuit photomaster

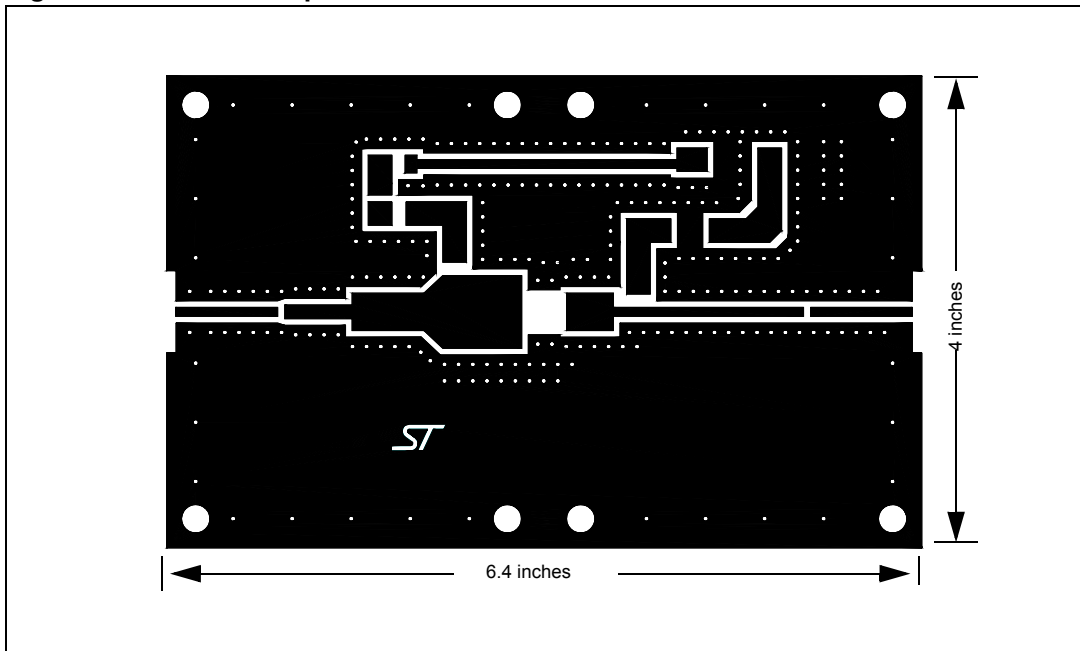
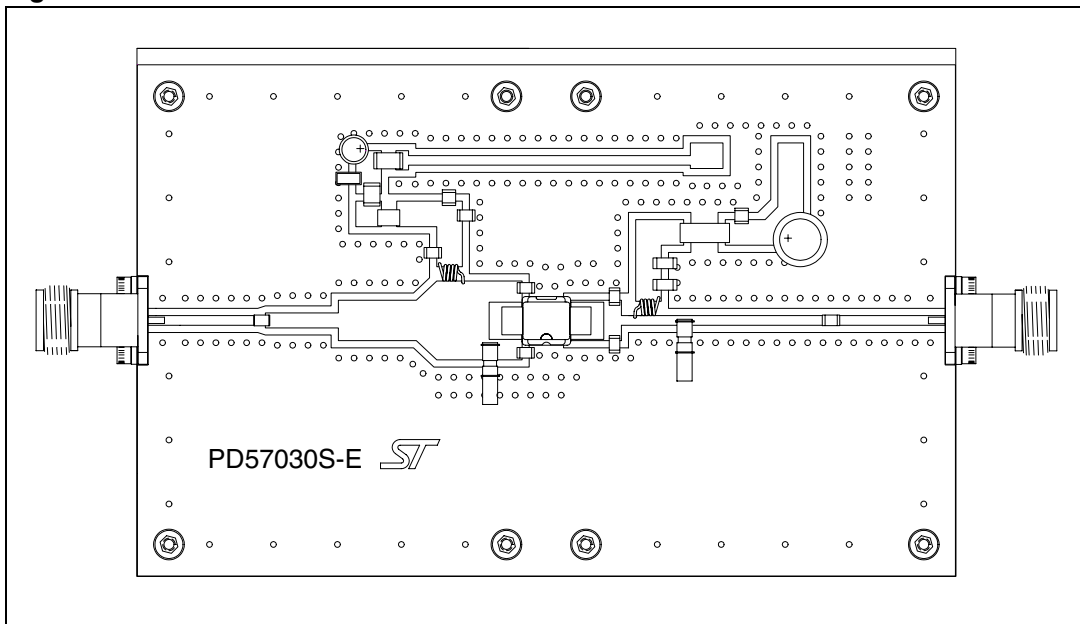


Figure 16. Test circuit



## 6 Package mechanical data

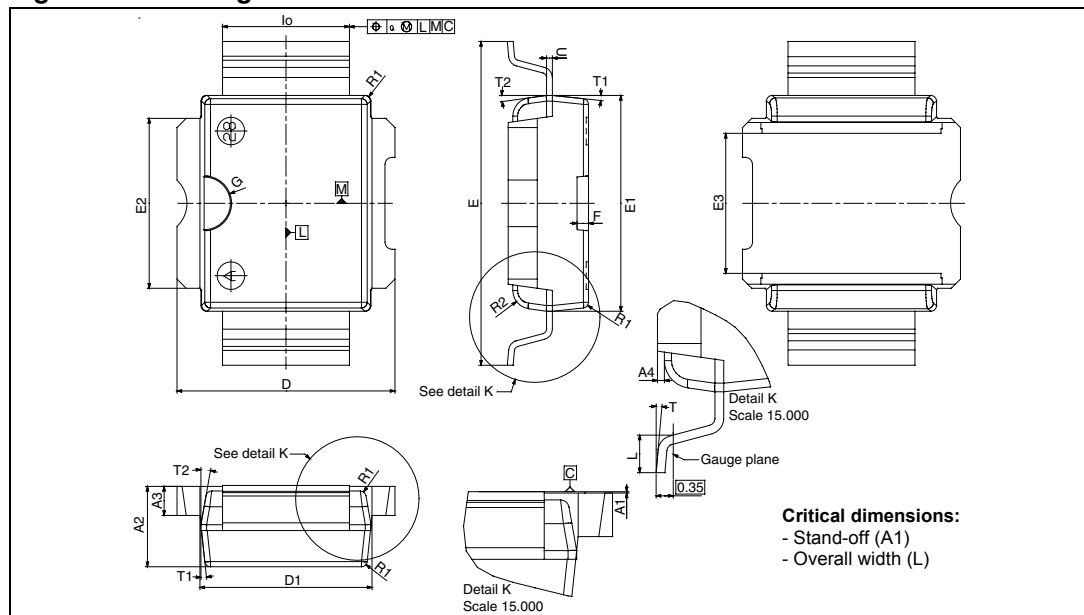
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Table 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 17. 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 18. Package dimensions**

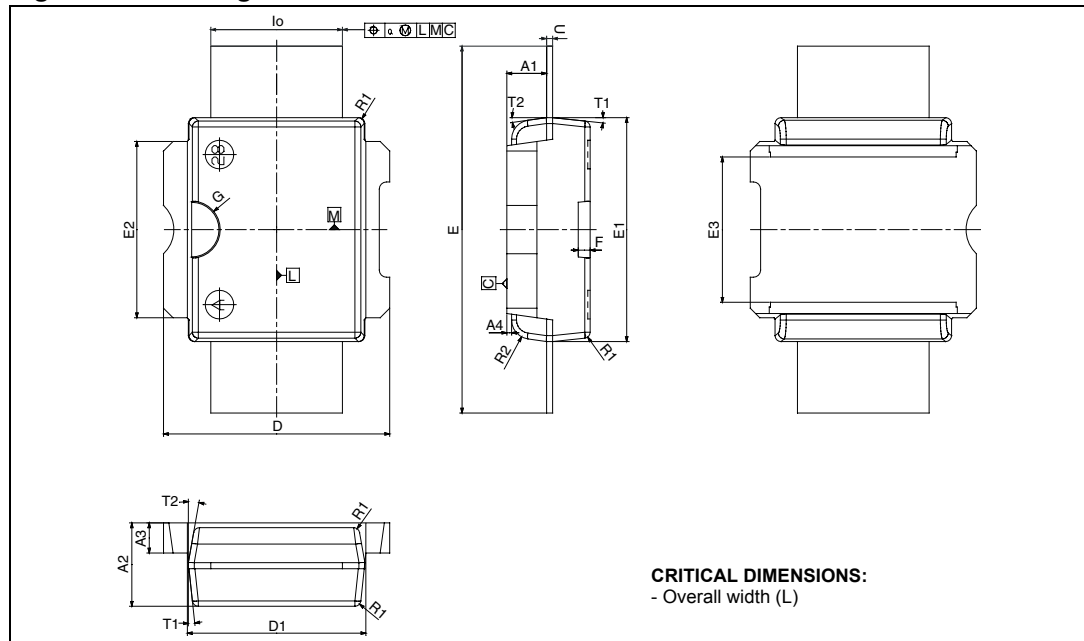


Figure 19. Tube information

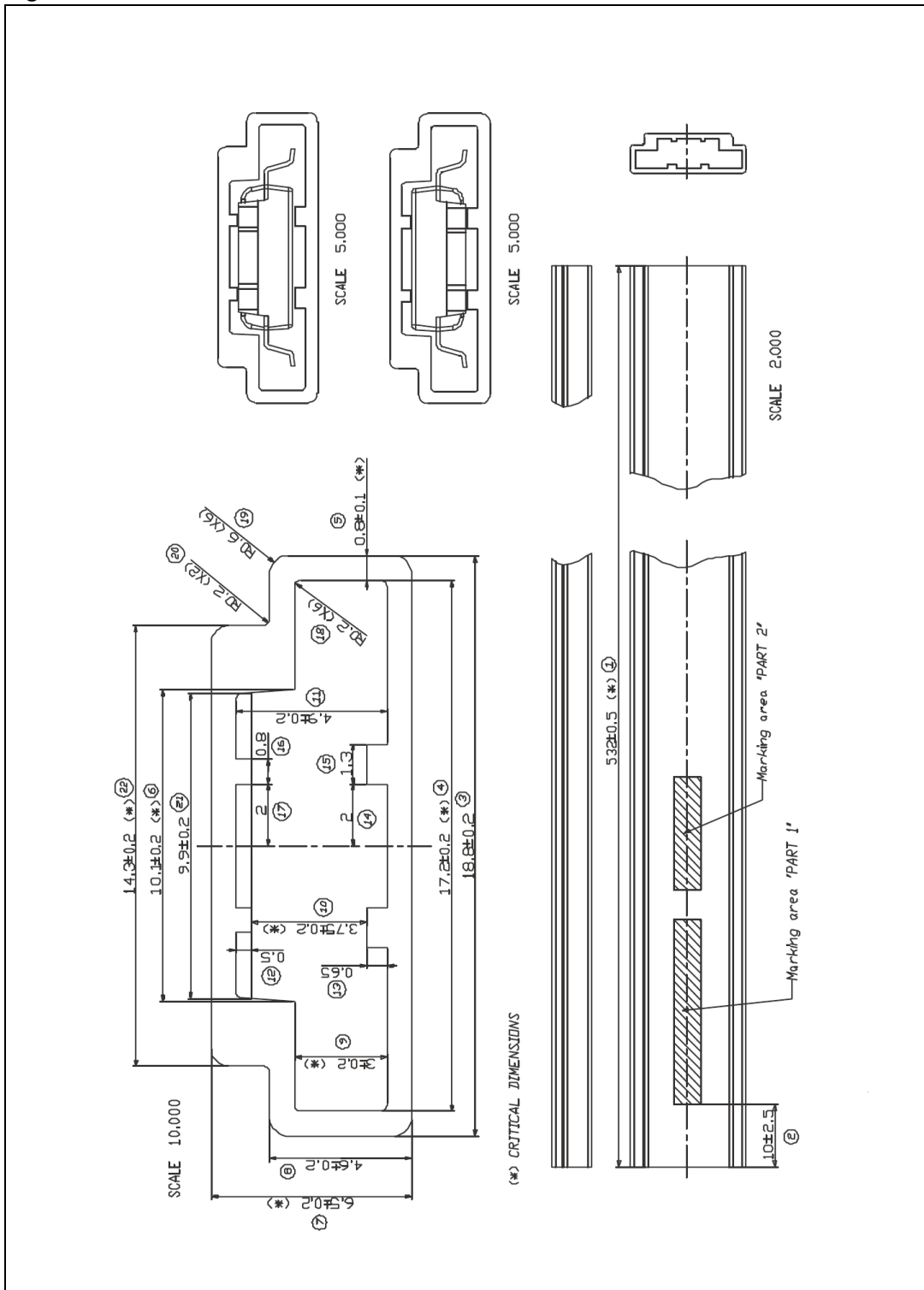
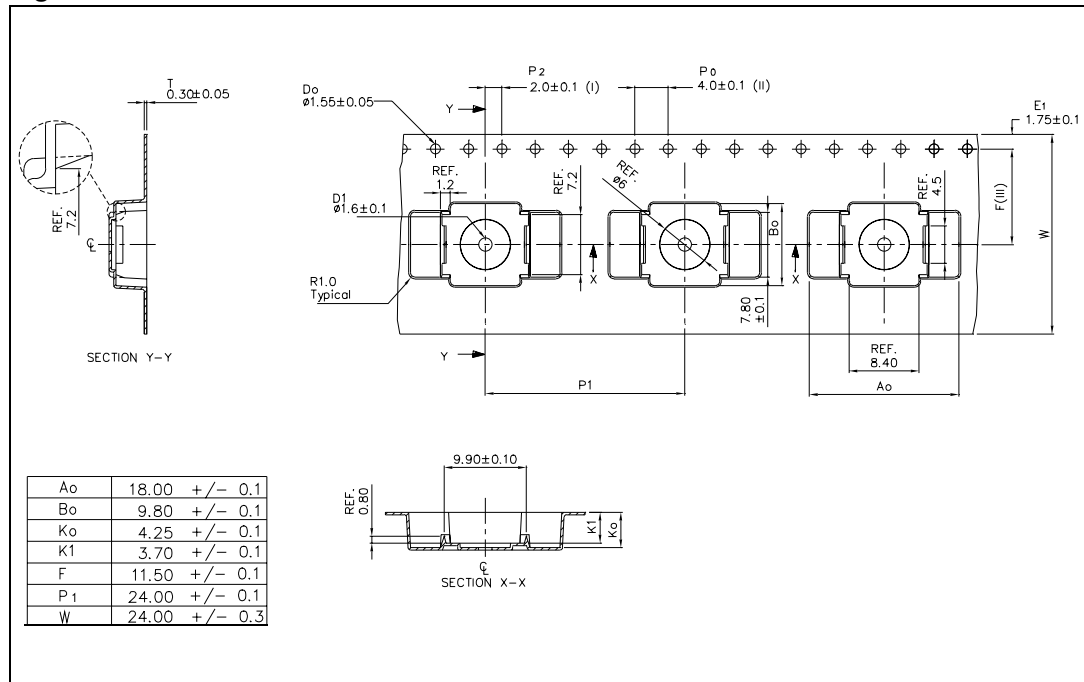




Figure 20. Reel information



## 7 Revision history

**Table 11. Document revision history**

<b>Date</b>	<b>Revision</b>	<b>Changes</b>
07-Aug-2006	1	Initial release.
28-May-2010	2	Added: <a href="#">Table 6: Moisture sensitivity level</a> .
24-Dec-2010	3	Content reworked to improve readability

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