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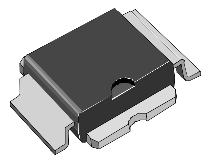
PD57030-E

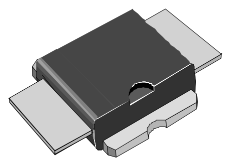
RF POWER transistor, LdmoST plastic family N-channel enhancement-mode, lateral MOSFETs

Features

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



PowerSO-10RF (formed lead)



PowerSO-10RF (straight lead)

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/ (look for application note AN1294)

Figure 1. Pin connection

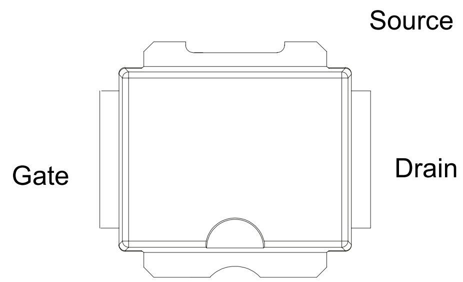


Table 1. Device summary

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

Contents

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	65	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current	4	A
P_{DISS}	Power dissipation (@ T_C = 70°C)	52.8	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	1.8	°C/W

2 Electrical characteristics

T_{CASE} = +25 °C

2.1 Static

Table 4. Static

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

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions				Min	Typ	Max	Unit
P_{OUT}	V_{DS} = 28 V	I_{DQ} = 50 mA		f = 945 MHz	30			W
G_P	V_{DS} = 28 V	I_{DQ} = 50 mA	P_{OUT} = 30 W	f = 945 MHz	13	14		dB
η_D	V_{DS} = 28 V	I_{DQ} = 50 mA	P_{OUT} = 30 W	f = 945 MHz	45	53		%
Load mismatch	V_{DS} = 28 V, all phase angles	I_{DQ} = 50 mA	P_{OUT} = 30 W	f = 945 MHz	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

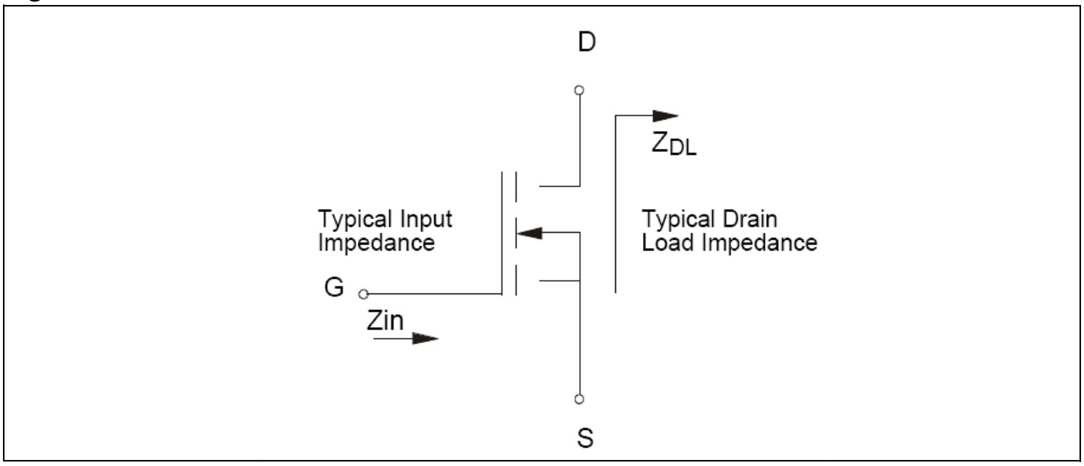


Table 7. Impedance data

Freq. (MHz)	Z_{IN} (Ω)	Z_{DL}(Ω)
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

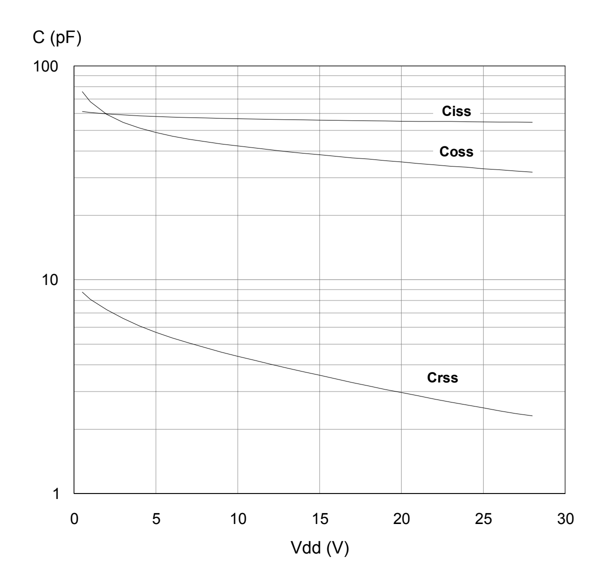
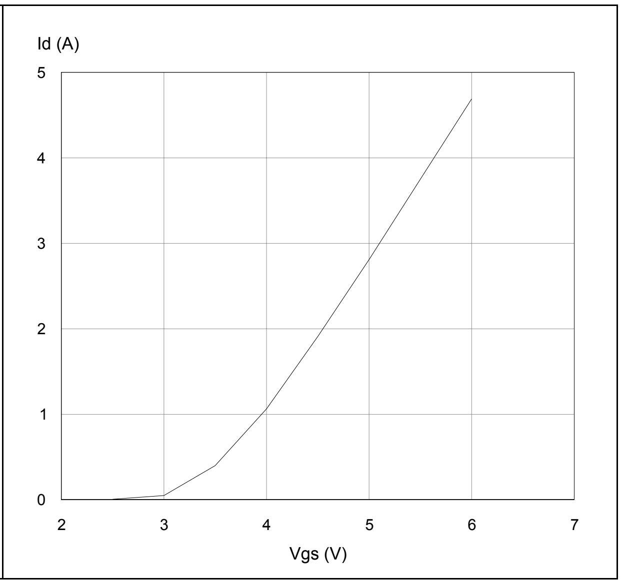
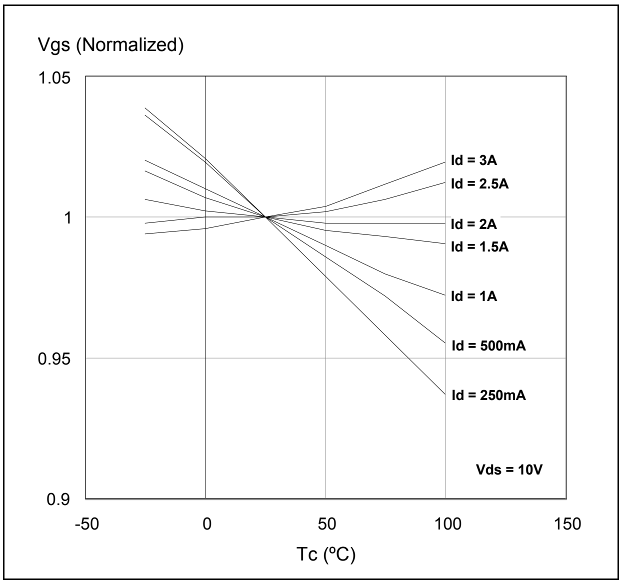


Figure 4. Drain current vs gate source voltage



Gate-source voltage vs case temperature



4.1 PD57030S-E

Figure 5. Output power vs input power

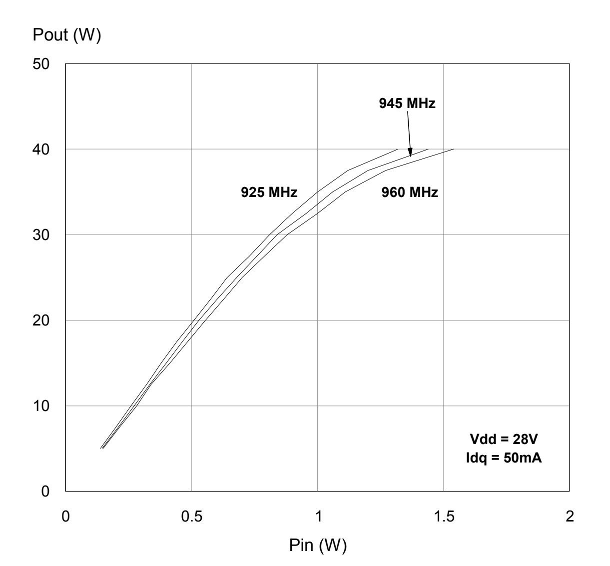


Figure 6. Input return loss vs output power

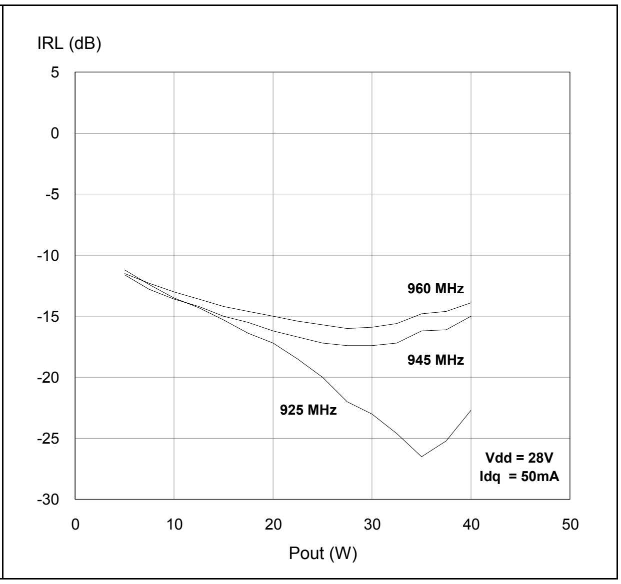


Figure 7. Power gain vs output power

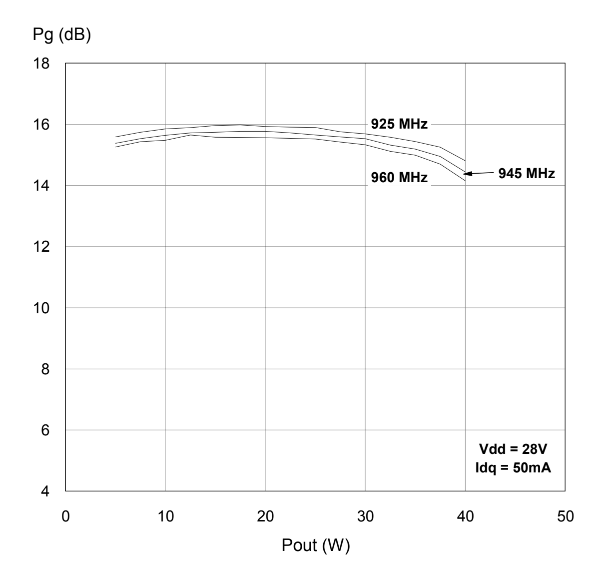


Figure 8. Efficiency vs output power

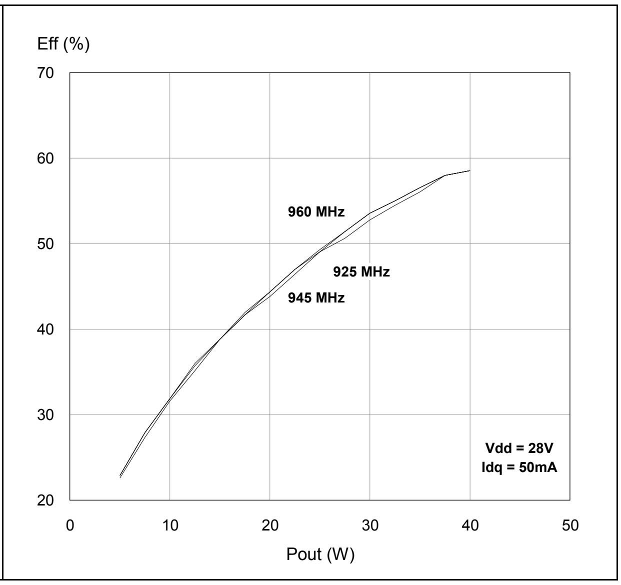


Figure 9. Output power vs bias current

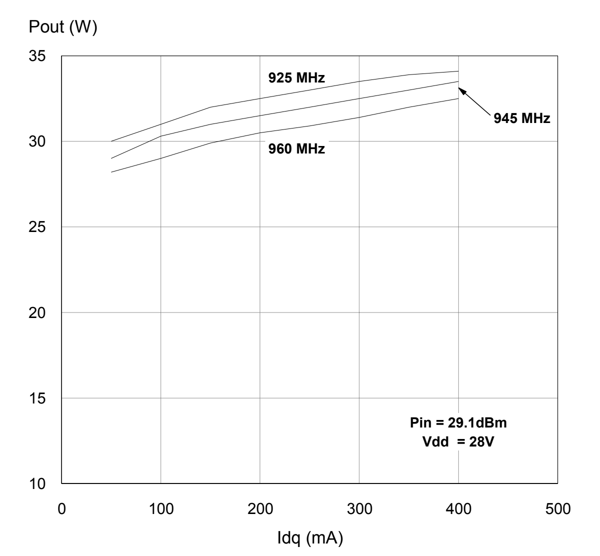


Figure 10. Efficiency vs bias current

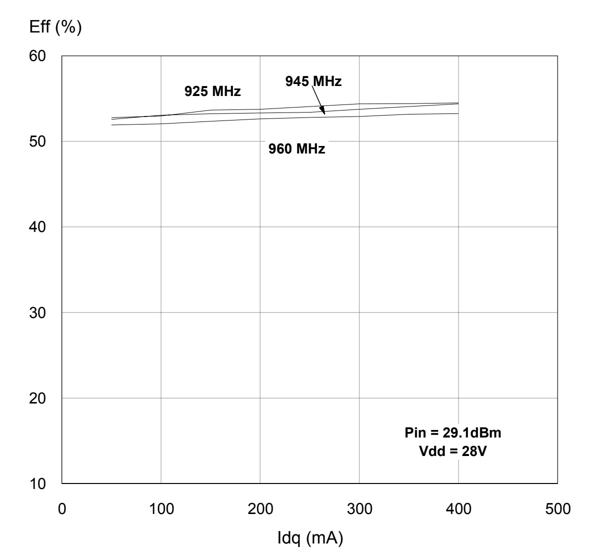


Figure 11. Output power vs drain voltage

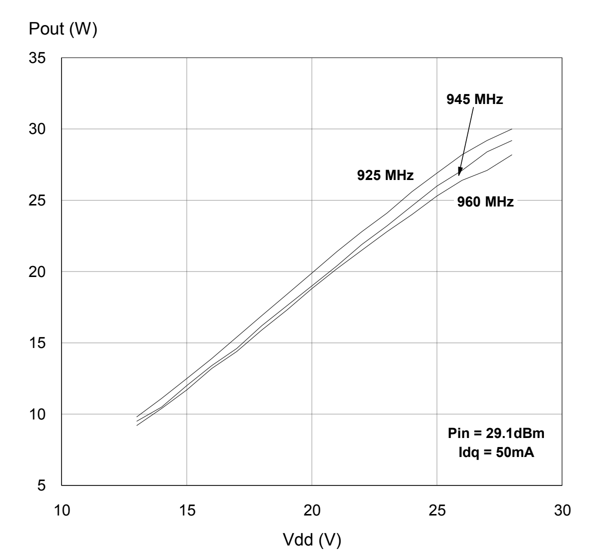


Figure 12. Efficiency vs drain voltage

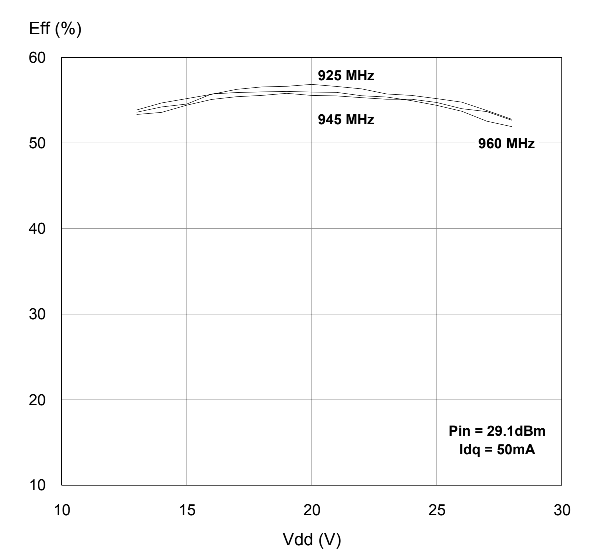
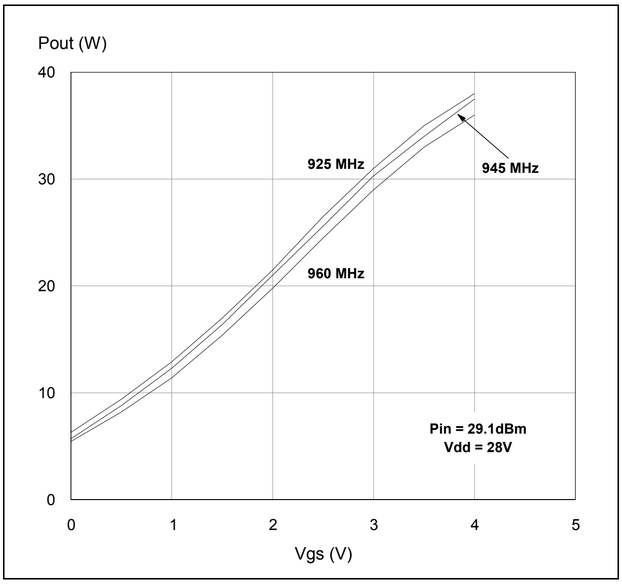


Figure 13. Output power vs gate-source voltage



5 Test circuit

Figure 14. Test circuit schematic

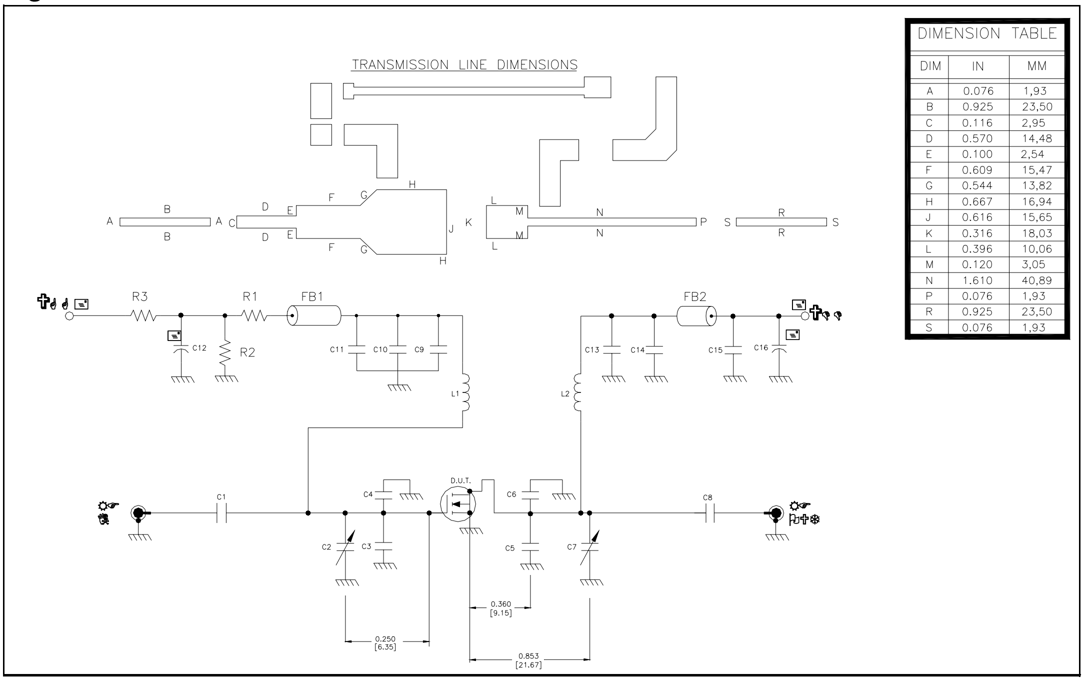


Table 8. Test circuit component part list

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

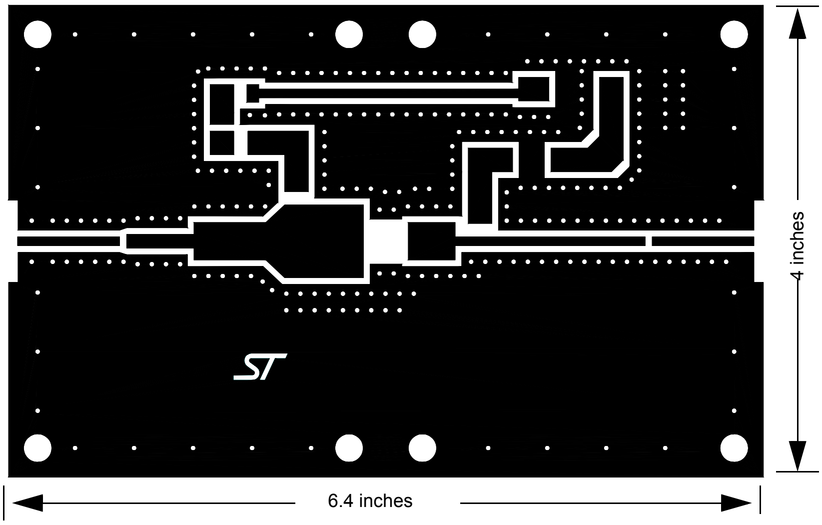
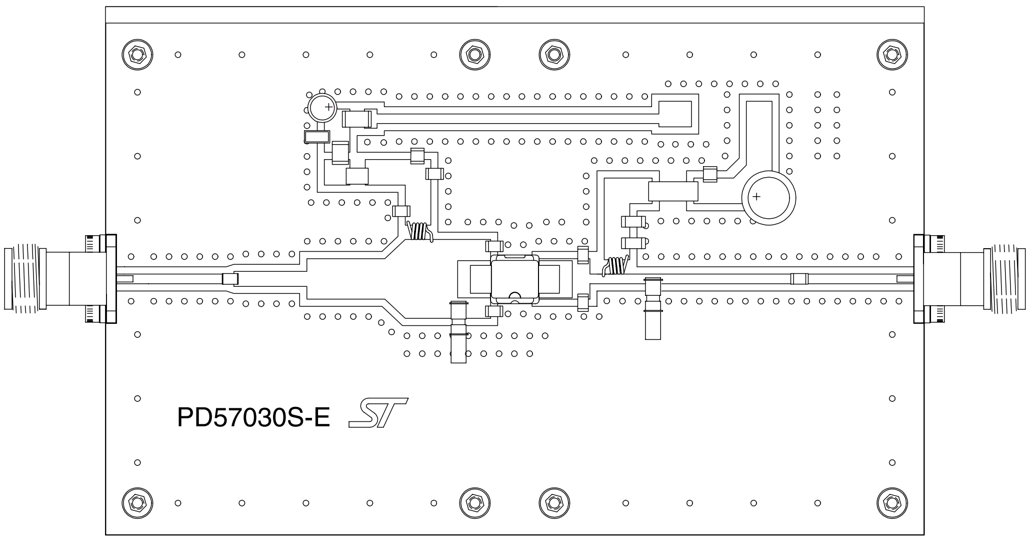


Figure 16. Test circuit



6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® 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 17. Package dimensions

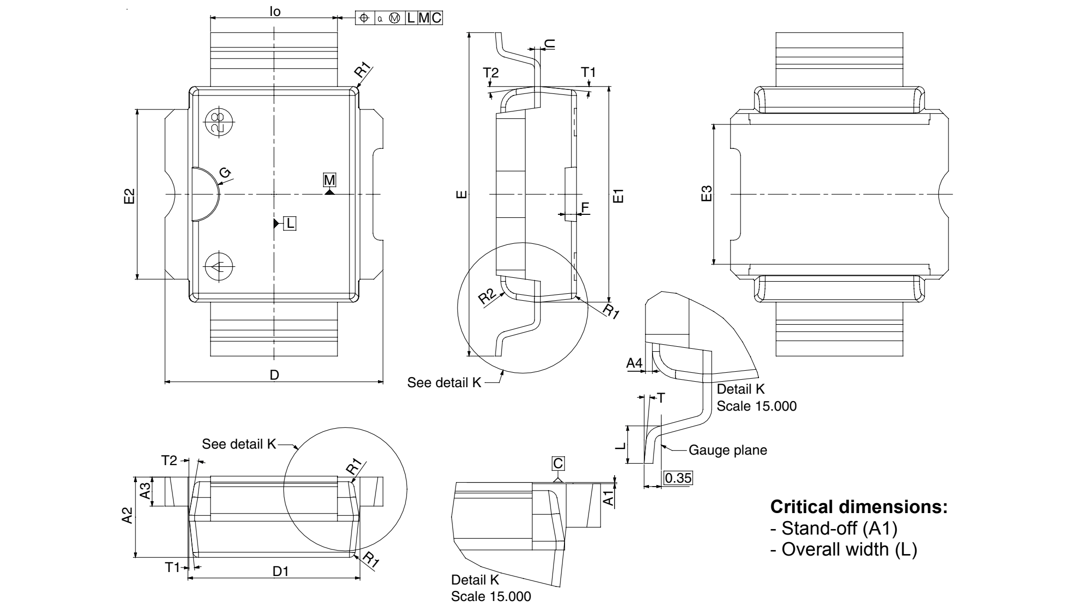


Table 10. PowerSO-10RF straight lead mechanical data

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

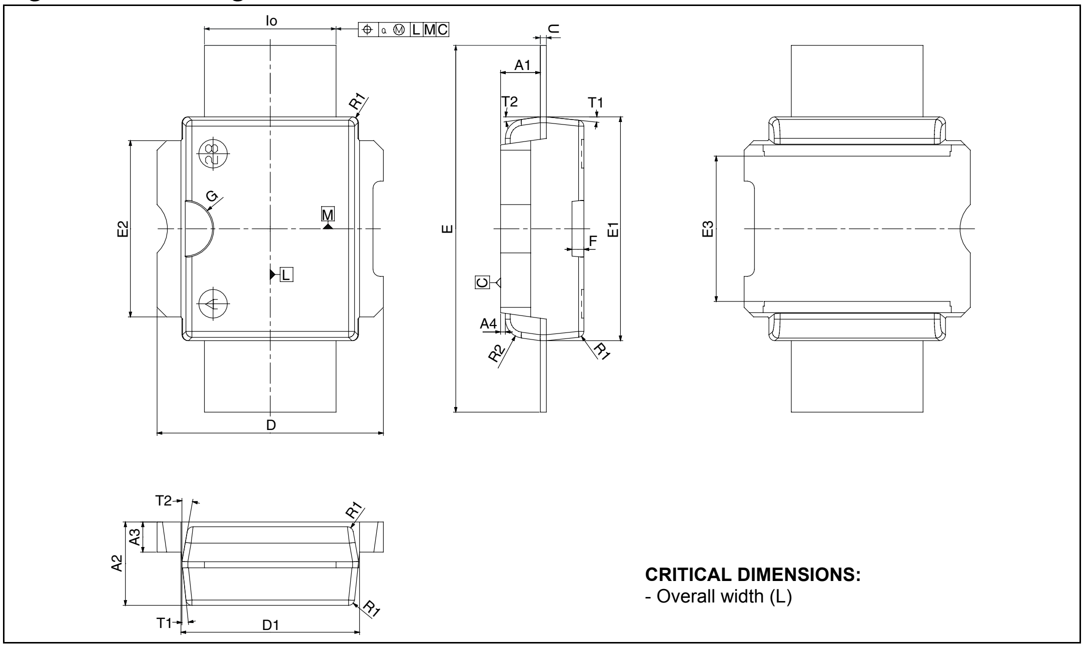


Figure 19. Tube information

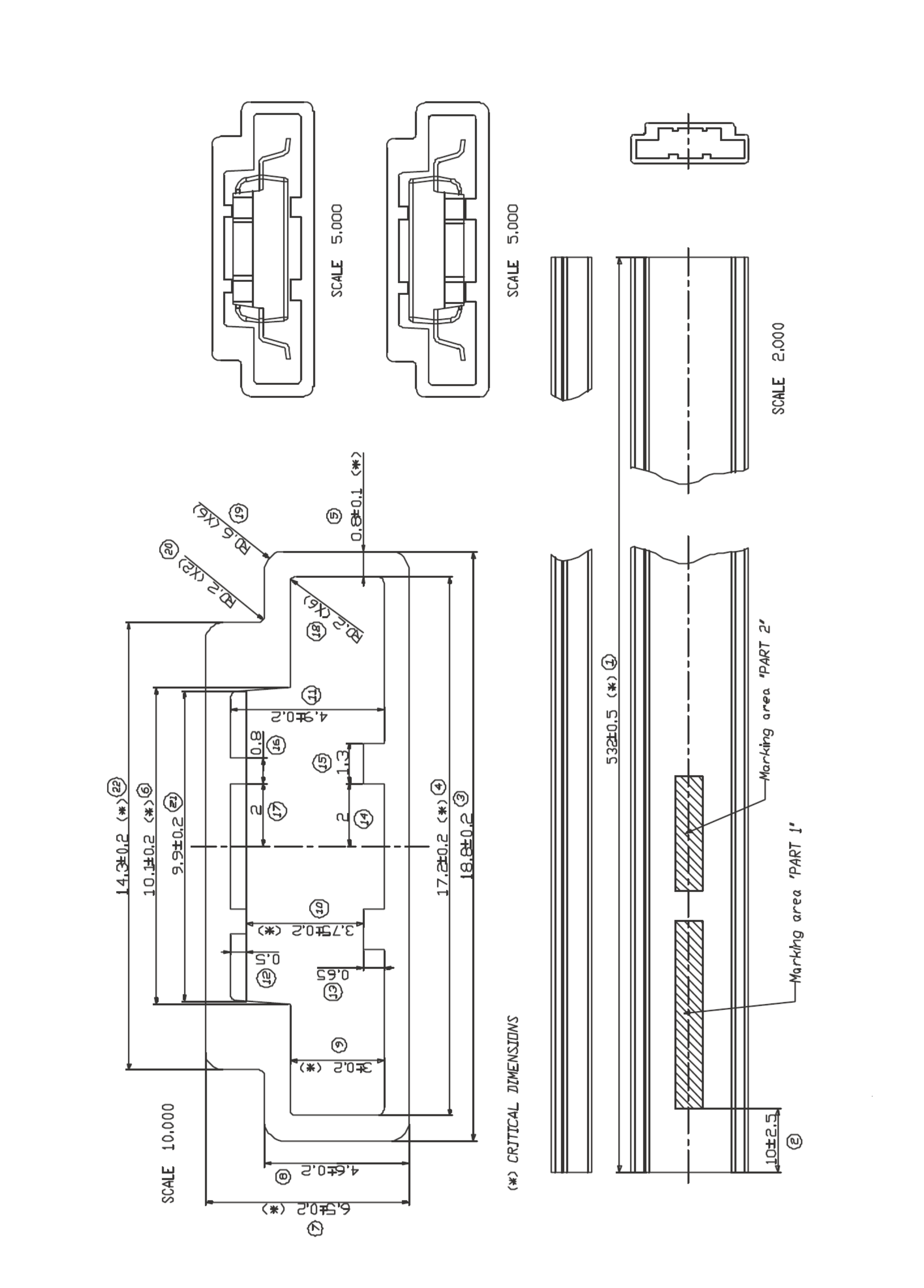
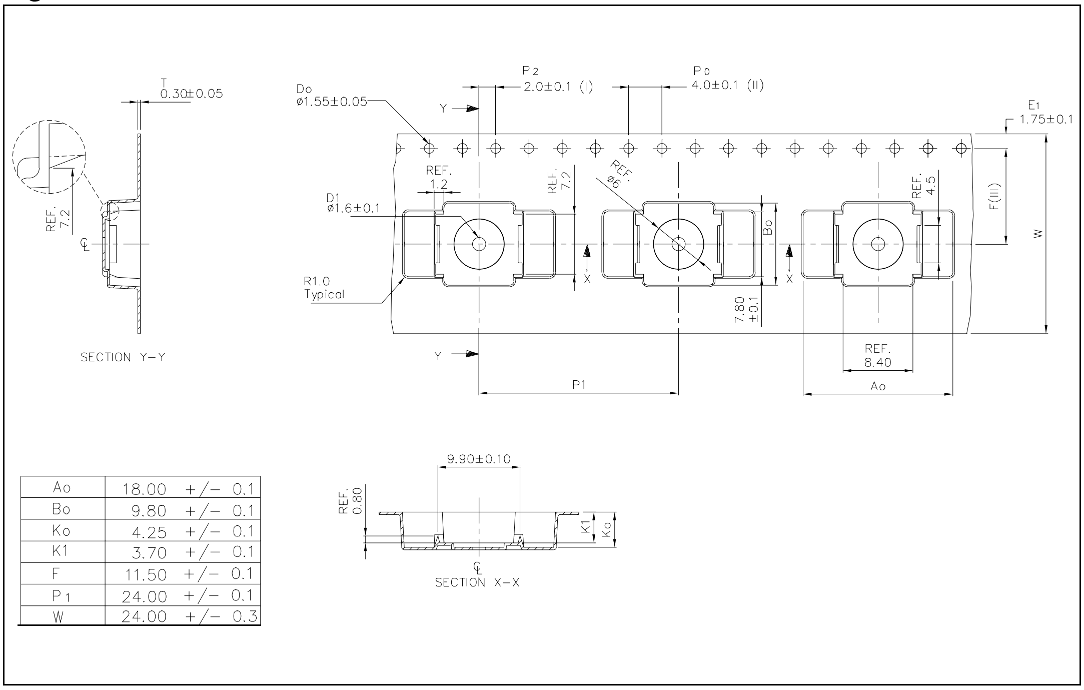


Figure 20. Reel information



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

7 Revision history

Table 11. Document revision history

Date	Revision	Changes
07-Aug-2006	1	Initial release.
28-May-2010	2	Added: *Table 6: Moisture sensitivity level*.
24-Dec-2010	3	Content reworked to improve readability

Please Read Carefully: