



DB-55015-490

RF power amplifier using 1 x PD55015-E N-channel enhancement-mode lateral MOSFETs

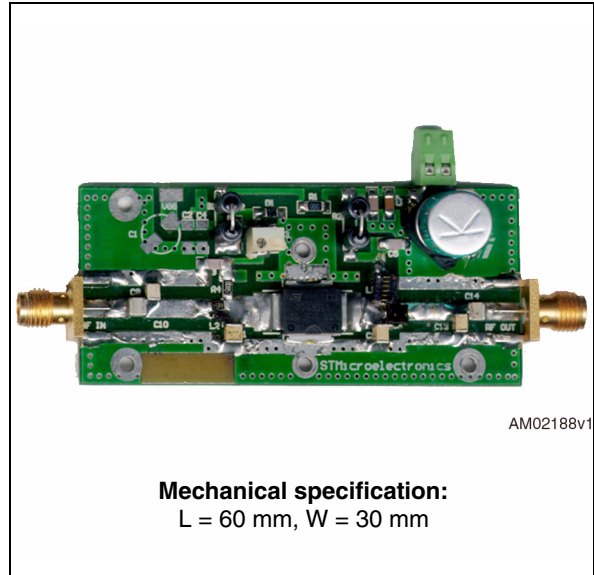
Preliminary Data

Features

- Excellent thermal stability
- Frequency: 420 - 490 MHz
- Supply voltage: 13.2 V
- Output power: 15 W
- Power gain: 13.5 ± 0.7 dB
- Efficiency: 51 % - 62 %
- Load mismatch: 20:1
- Beo free amplifier

Description

The DB-55015-490 is a common source N-channel enhancement-mode lateral field effect RF power amplifier designed for UHF mobile radio applications.



Mechanical specification:
L = 60 mm, W = 30 mm

Table 1. Device summary

Order codes
DB-55015-490

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1 Electrical data

1.1 Maximum ratings

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Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	24	V
I_D	Drain current	3	A
P_{DISS}	Power dissipation	25	W
T_{CASE}	Operating case temperature	-20 to +85	°C
T_A	Max. ambient temperature	55	°C

2 Electrical characteristics

$T_A = +25\text{ °C}$, $V_{DD} = 13.2\text{ V}$, $I_{DQ} = 150\text{ mA}$

Table 3. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
Freq	Frequency range	420		490	MHz
P_{OUT}		14	18		W
Gain	@ $P_{IN} = 29\text{ dBm}$		13.5 ± 0.7		dB
ND	@ $P_{IN} = 29\text{ dBm}$		51 - 62		%
H2	2 ND Harmonic @ $P_{IN} = 27\text{ dBm}$		-40	-35	dBc
H3	3 RD Harmonic @ $P_{IN} = 27\text{ dBm}$		-60	-55	dBc
VSWR	Load mismatch all phases @ $P_{IN} = 27\text{ dBm}$			20:1	

3 Impedance

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Figure 1. Impedance graphic

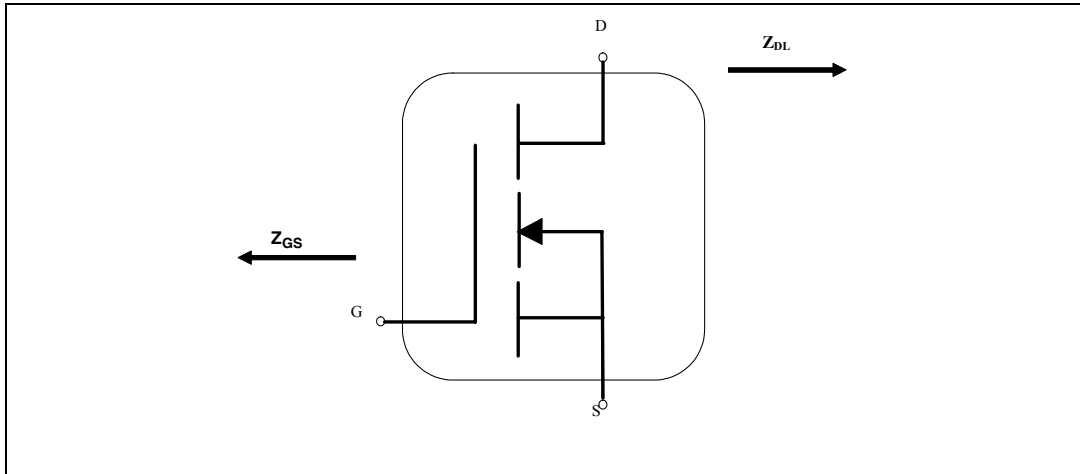


Table 4. Impedance data

f(MHz)	$Z_{GS} (\Omega)$	$Z_{DL} (\Omega)$
400	$1.8 + j0,31$	$1.9 + j0,11$
410	$1.9 + j0,52$	$1.9 + j0,4$
420	$1.8 + j0,80$	$1.8 + j0,67$
430	$1.8 + j1,06$	$1.8 + j0,92$
440	$1.8 + j1,28$	$1.8 + j1.17$
450	$1.8 + j1,50$	$1.8 + j1.37$
460	$1.7+ j1,70$	$1.6 + j1.59$
470	$1.7 + j1.90$	$1.5 + j1.78$
480	$1.6 + j2,05$	$1.4 + j1,96$
490	$1.6 + j2,20$	$1.3 + j2,18$
500	$1.4 + j2,40$	$1.1 + j2,42$

4 Typical performance

Figure 2. Gain vs output power
 V_{dd} = 13.2 V, I_{dq} = 150 mA

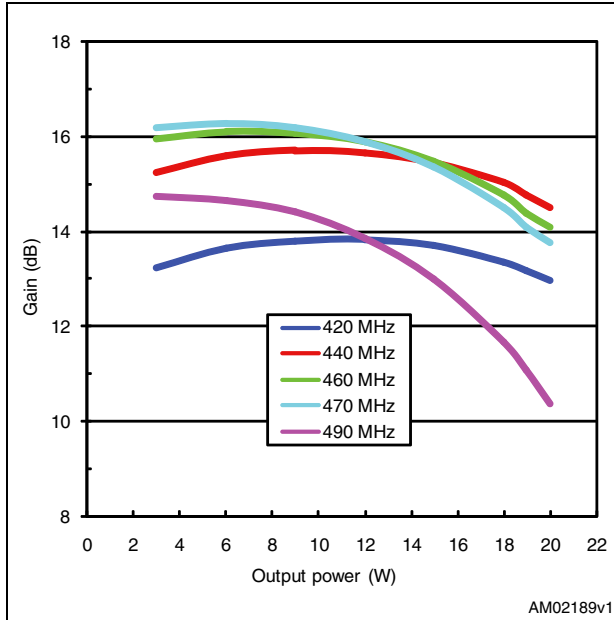


Figure 3. Efficiency vs output power
 power_V_{dd} = 13.2 V, I_{dq} = 150 mA

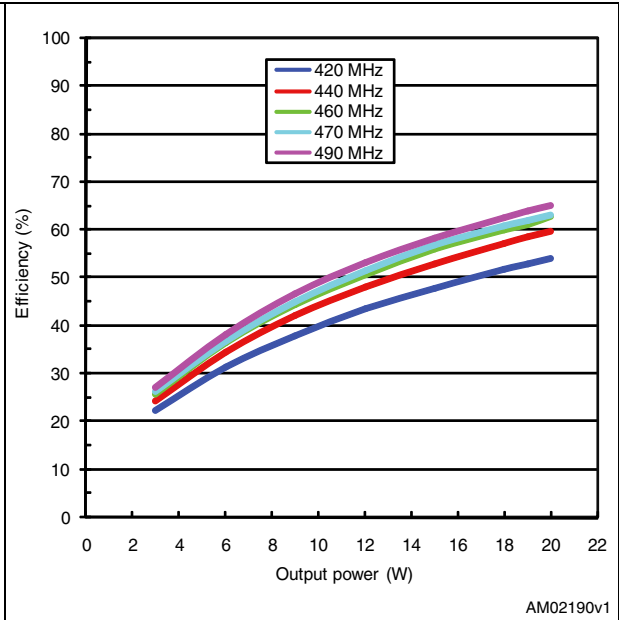


Figure 4. Output power and efficiency vs frequency
 V_{dd} = 13.2 V, I_{dq} = 150 mA, P_{in} = 29 dBm

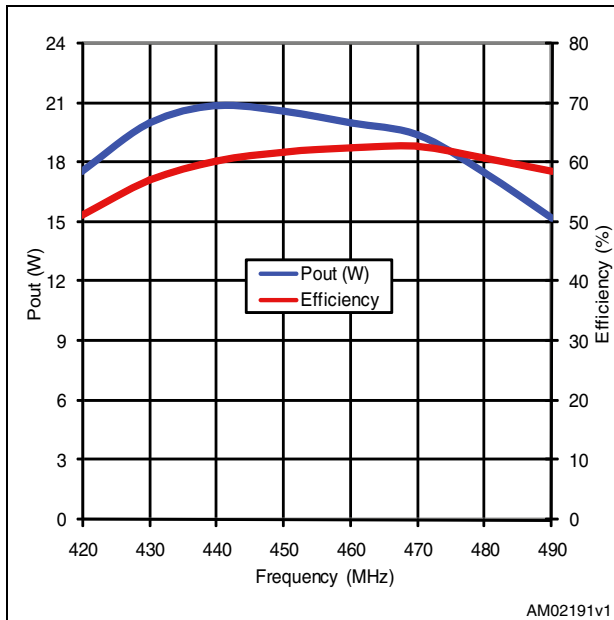


Figure 5. Gain vs frequency
 V_{dd} = 13.2 V, I_{dq} = 150mA, P_{in} = 29 dBm

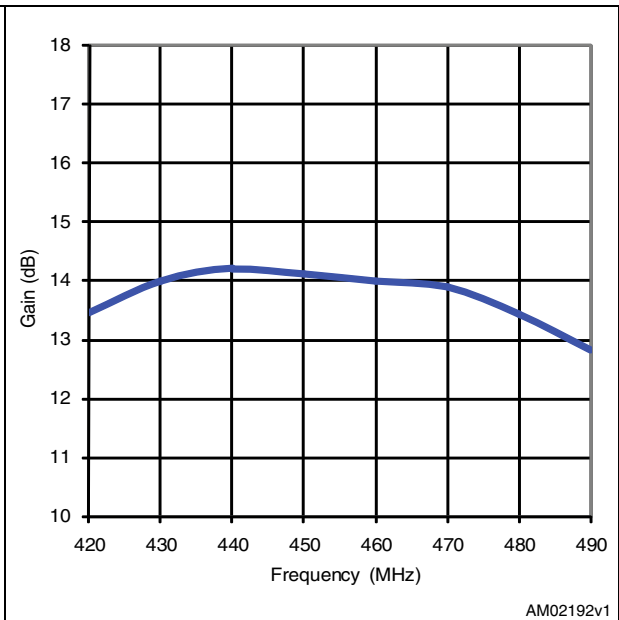
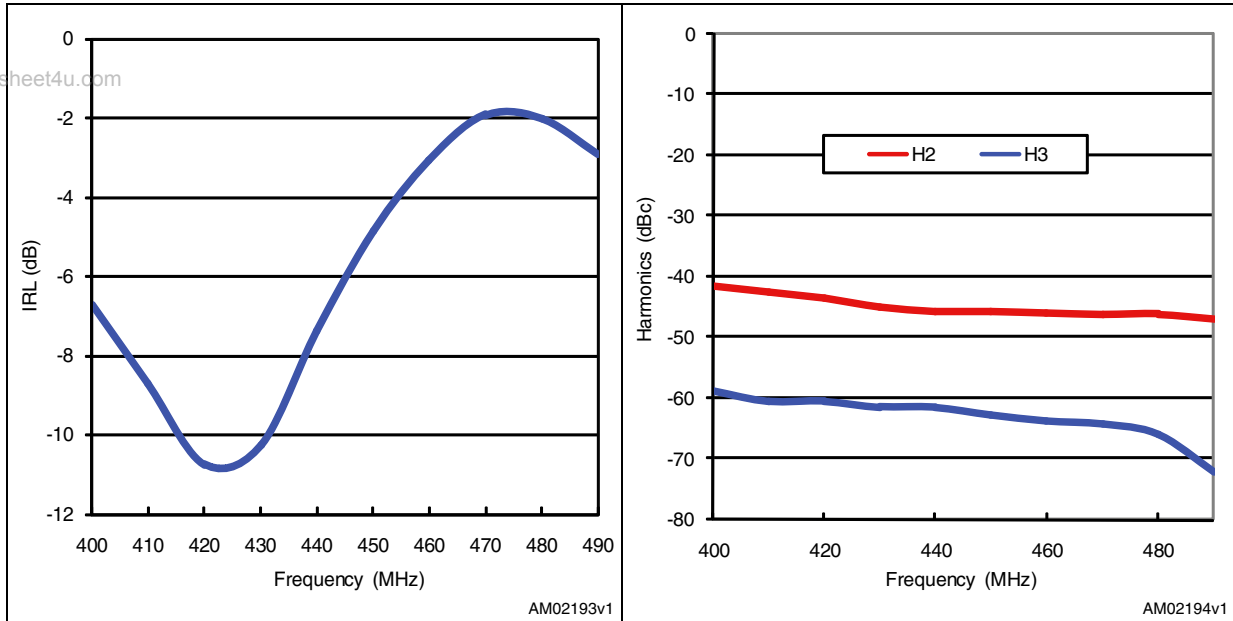


Figure 6. Input return loss vs frequency_Vdd = 13.2 V, Idq = 150 mA, Pin = 29dBm

Figure 7. Harmonics vs frequency_Vdd = 13.2 V, Idq = 150 mA, Pin = 27 dBm



5 Test circuit

Table 5. Test circuit schematic

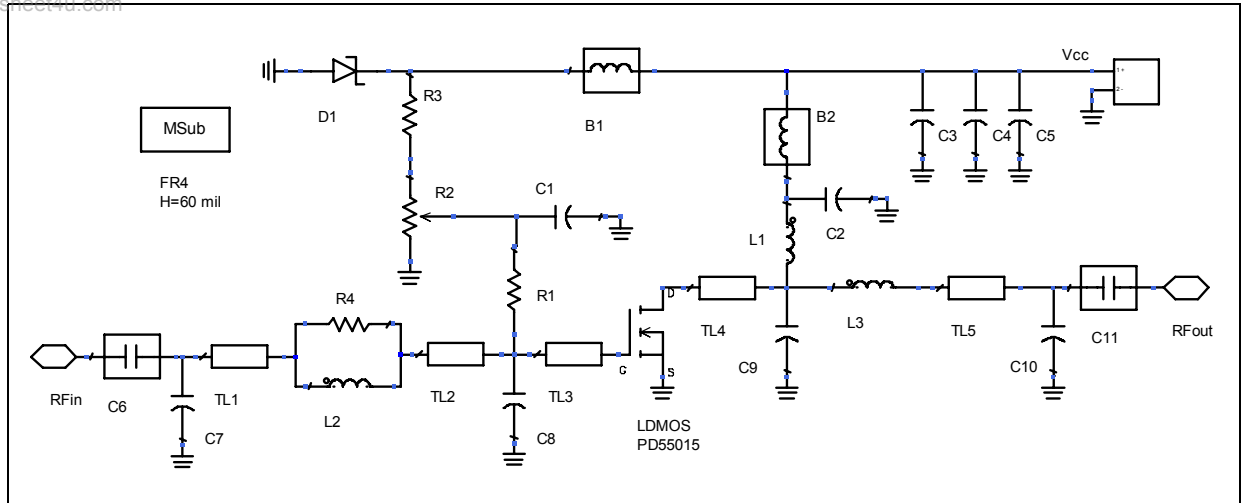


Table 6. Components part list

Component ID	Description	Value	Case size	Manufacturer	Part code
B1, B2	Ferrite Bead			PANASONIC	EXCELDRC35C
D1	Zener Diode	5.1 V	SOD110	PHILIPS	BZX284C5V1
L1	Inductor	39 nH	Midi	COILCRAFT	1812SMS-39N
L2	Inductor	2.55 nH	Micro	COILCRAFT	0906-3
L3	Inductor	5 nH	Mini	COILCRAFT	A02T
R1	Resistor	560 Ω	0603	Tyco electronics	
R2	Potentiometer	10 kΩ		Bourns electronics	3214W-1-103E
R3	Resistor	1 kΩ		Tyco electronics	
R4	Resistor	15 Ω	0603	Tyco electronics	
C1, C2	Capacitor	120 pF	1206	Murata	GRM42-6C0G121
C3	Capacitor	1 nF	1206	Murata	GRM188R71H102K
C4	Capacitor	10 nF	1206	Murata	GRM188R71H103K
C5	Electrolytic Capacitor	220 μF-35 V		Rubycon	N0037
C6, C11	Capacitor	470 pF	1206	Murata	MA69471JBB
C7	Capacitor	15 pF	100B	ATC	150
C8, C9	Capacitor	47 pF	100B	ATC	470
C10	Capacitor	11 pF	100B	ATC	110
TL1	Transmission line		W = 2.83 mm, L = 10.23 mm		

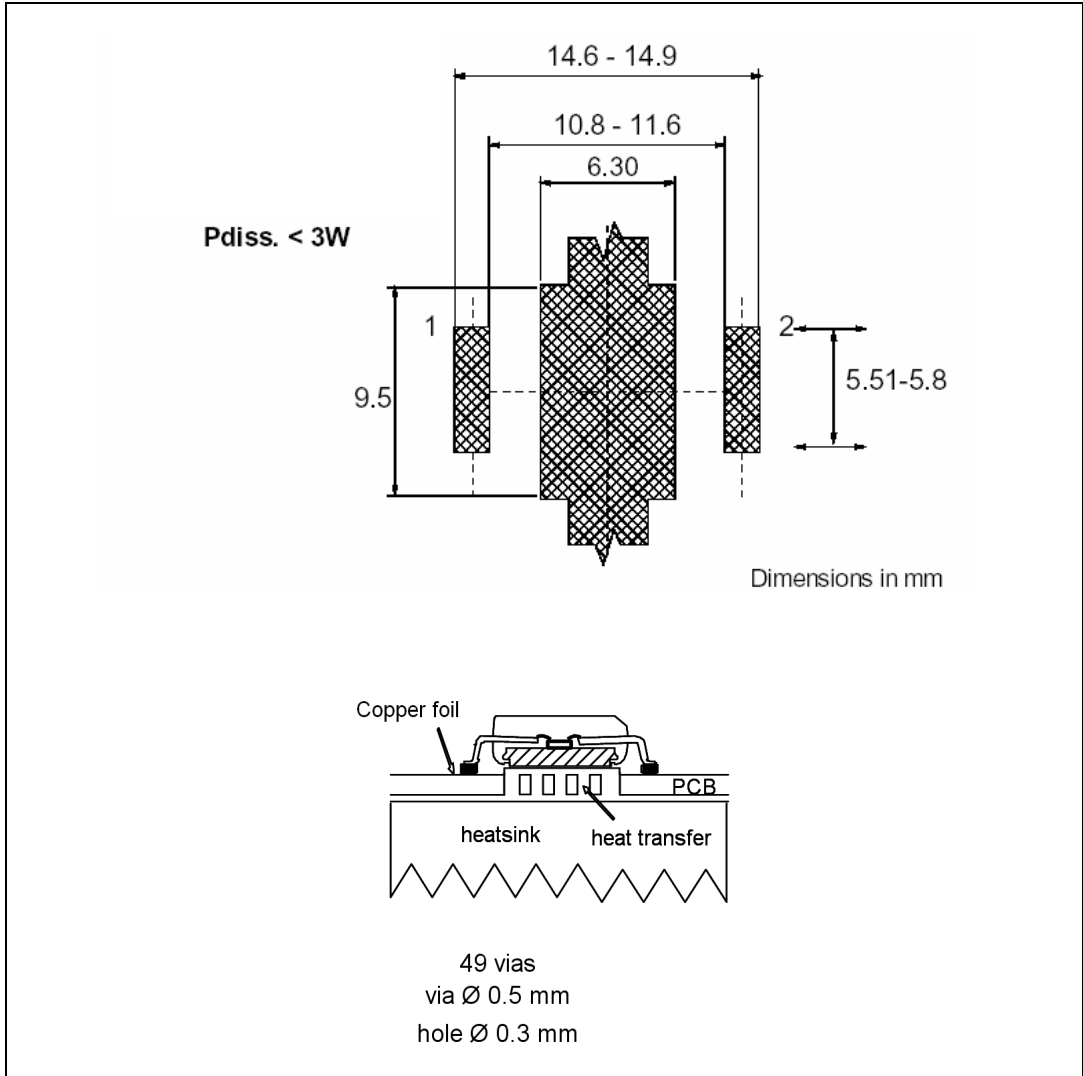
Table 6. Components part list (continued)

Component ID	Description	Value	Case size	Manufacturer	Part code
TL2			W = 4.9 mm, L = 1 mm		
TL3			W = 4.9 mm, L = 2.48 mm		
TL4			W = 4.9 mm, L = 2.6 mm		
TL5			W = 2.83 mm, L = 9.6 mm		
RF in, RF out	SMA-CONN		60 mils	JOHNSON	142-0701-801
PD55015-E	LDMOS			STMicroelectronics	PD55015-E
Board	FR-4 THk=0.060" 2OZ Cu both sides				

6 Mounting indications

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Figure 8. PowerSO-10 mounting indications



7 Package mechanical data

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Table 7. 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	

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

Figure 9. Package dimensions

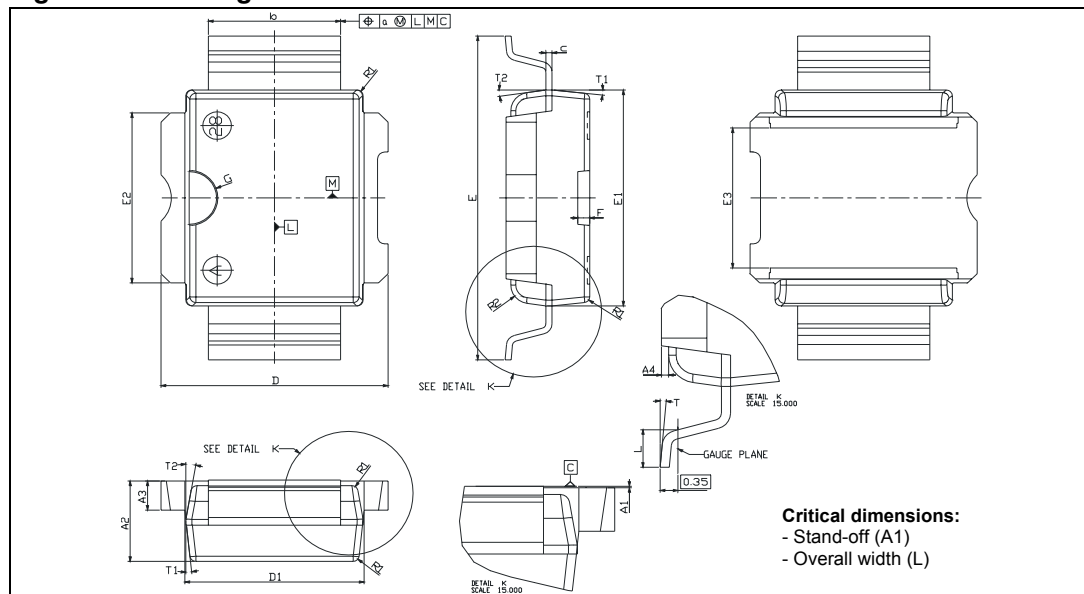
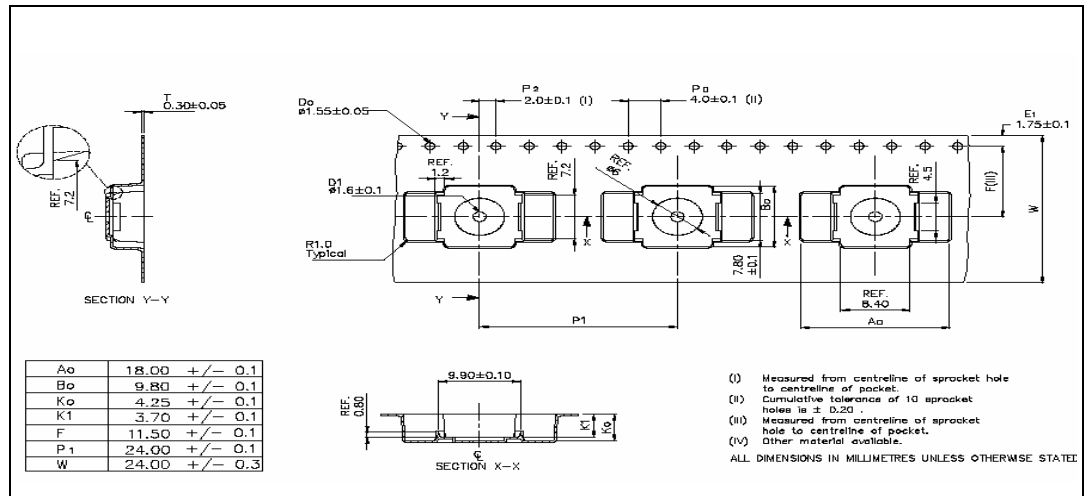


Figure 10. PowerSO-10RF tape and reel

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8 Revision history

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Table 8. Document revision history

Date	Revision	Changes
18-Mar-2009	1	Initial release.

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