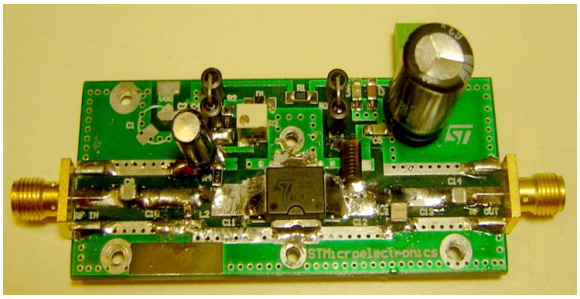
DB-57006-600

RF POWER amplifier using 1 x PD57006 N-channel enhancement-mode lateral MOSFETs

General Feature

- Excellent thermal stability
- Frequency: 300 - 600MHz
- Supply voltage: 26V
- Output power: 1W
- Operation: class A
- IMD3 (2 tones test): < -40 dBc @ 1W avg
- Load mismatch: 30:1
- Beo free amplifier



Mechanical specification:
L = 70 mm, W = 30 mm

Description

The DB-57006-600 is a common source N-Channel Enhancement-Mode Lateral Field Effect RF power amplifer designed as linear driver for UHF repeater applications.

Order code

- DB-57006-600

Contents

1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	32	V
I_D	Drain Current	1	A
T_{CASE}	Operating Case Temperature	-20 to +85	°C
T_A	Max. Ambient Temperature	+55	°C

2 Electrical characteristics

T_A = +25 °C, V_{DD} = 26V, I_{dq} = 700mA

Table 2. Electrical specification

Symbol	Test conditions	Min	Typ	Max	Unit
Freq	Frequency Range	300		600	MHz
P_{OUT}			1		W
Gain	@ P_{OUT} = 20W		17.0 ±3.7		dB
IMD3	2 tones : 1MHz spacing - 1W avg		-42		dB
IMD3	2 tones : 1MHz spacing - 0.5W avg		-49		dB
IMD3	2 tones : 1MHz spacing - 0.25W avg		-52		dB
VSWR	Load Mismatch all phases @ P_{OUT} = 8W			30:1	

2.1 Class AB

T_A = +25 °C, V_{DD} = 26V, I_{dq} = 50mA

Table 3. Class AB

Symbol	Test conditions	Min	Typ	Max	Unit
Freq	Frequency Range	460		600	MHz
P_{OUT}		8	10		W
Gain			14.2 ±3.0		dB
Efficiency	@ P_{OUT} = 10W		43 - 61		%
H2	@ P_{OUT} = 8W		-20 / -29		dBc
H3	@ P_{OUT} = 8W		-39 / -60		dBc
VSWR	Load Mismatch all phases @ P_{OUT} = 8W			20:1	

3 Typical performance (Class A)

Figure 1. Gain vs frequency

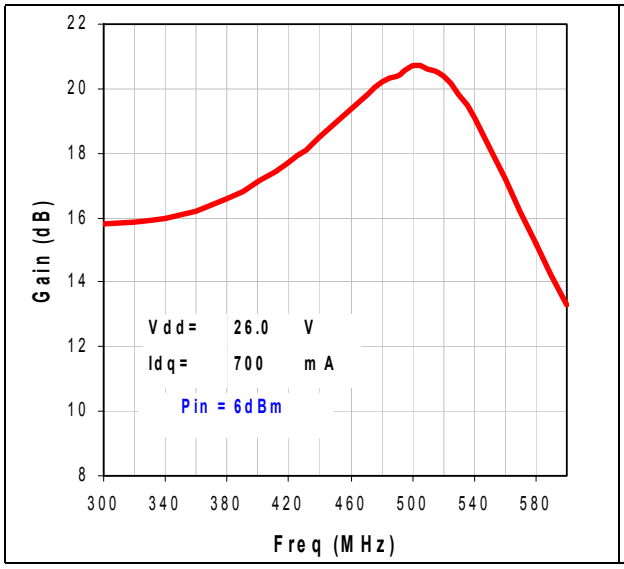


Figure 2. IMD3 vs output power

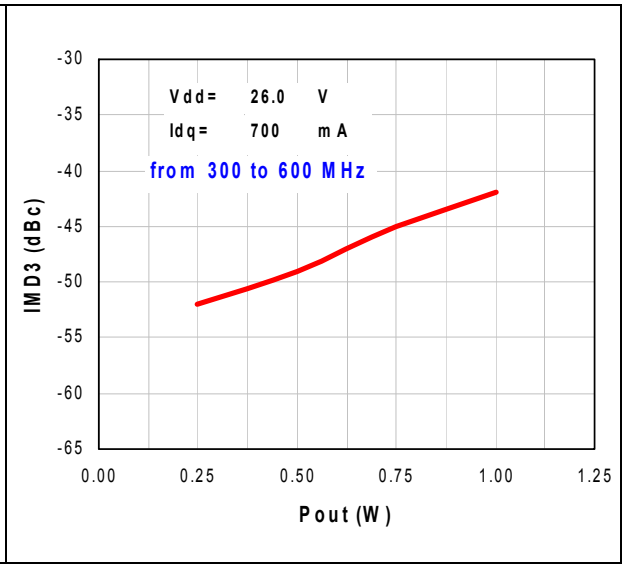
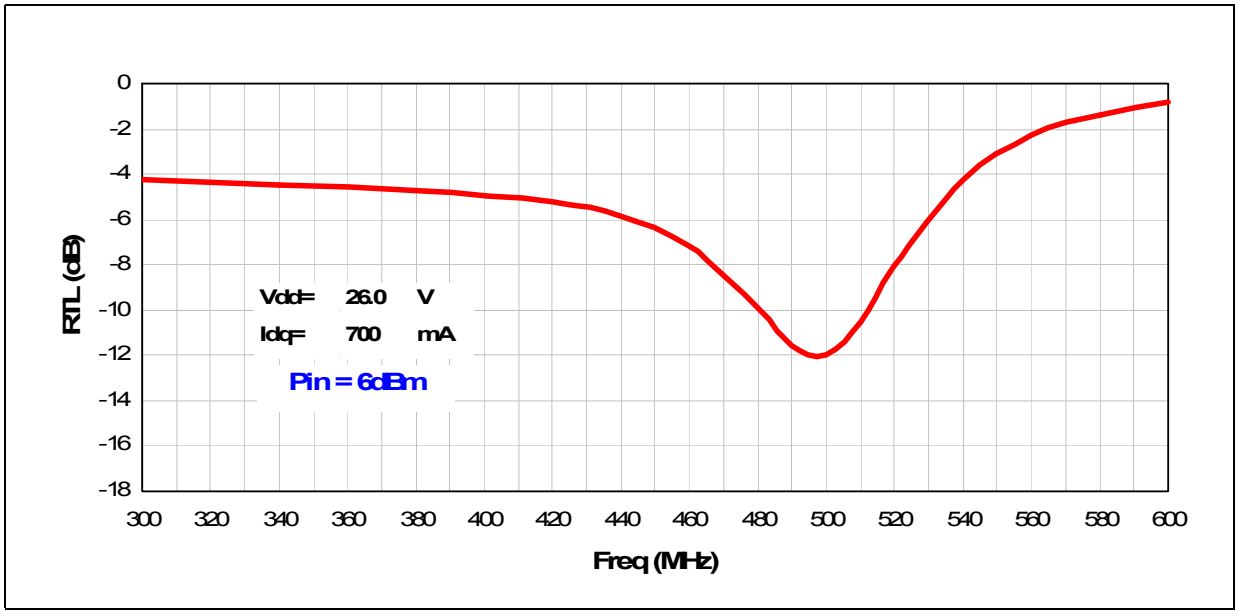


Figure 3. Input return loss vs frequency



4 Typical performance (Class AB)

Figure 4. Gain vs frequency

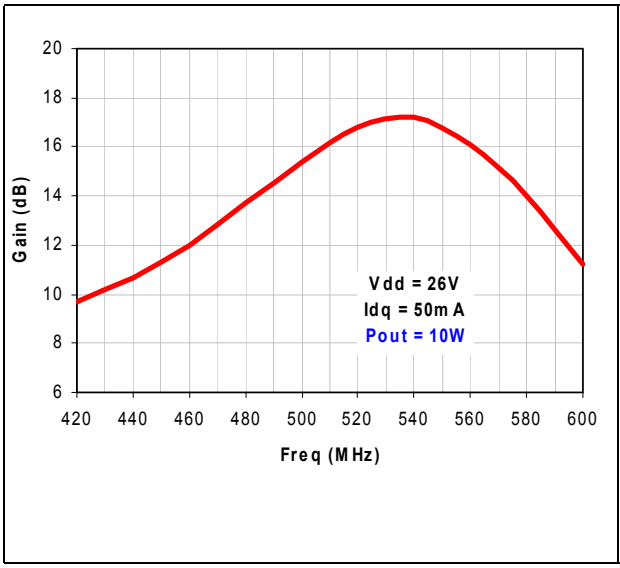


Figure 5. Output power vs input power & frequency

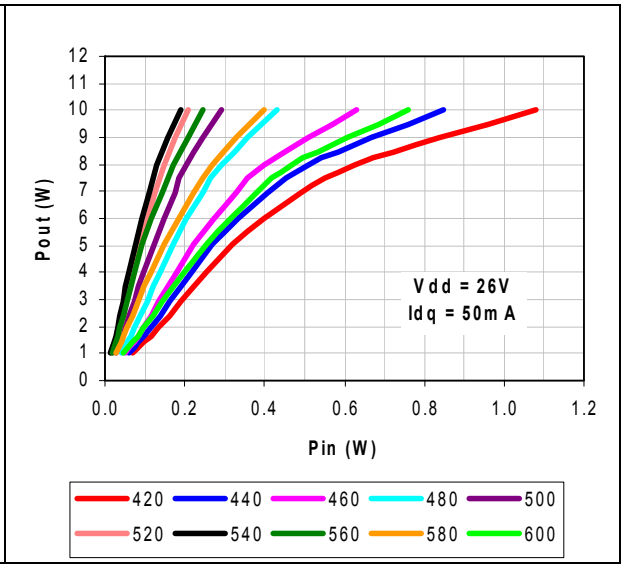


Figure 6. Efficiency vs output power & frequency

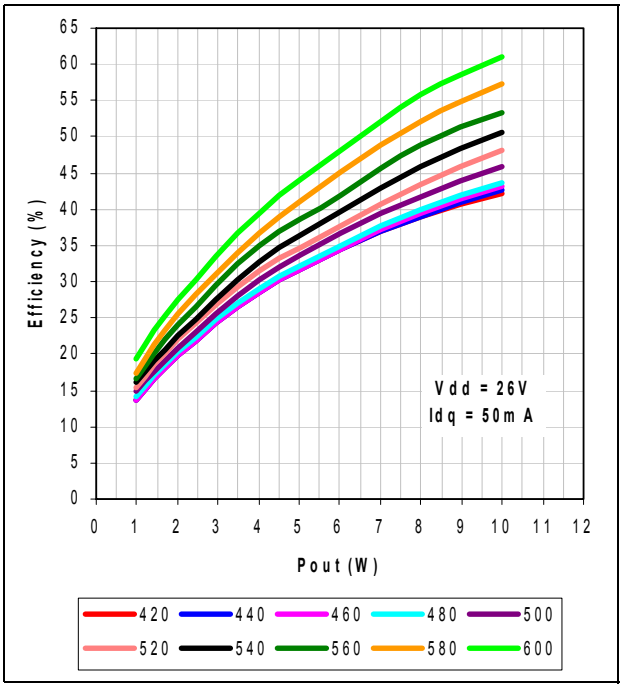
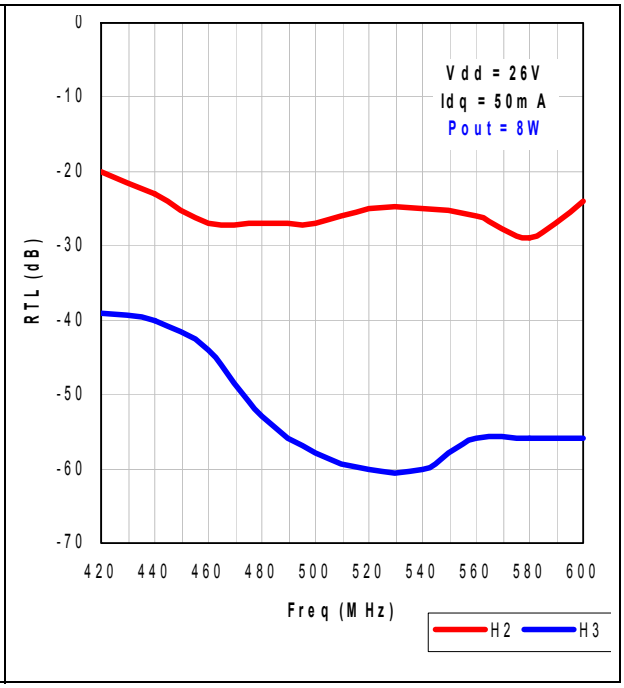


Figure 7. Harmonics vs frequency



5 Test circuit

Table 4. Test circuit schematic

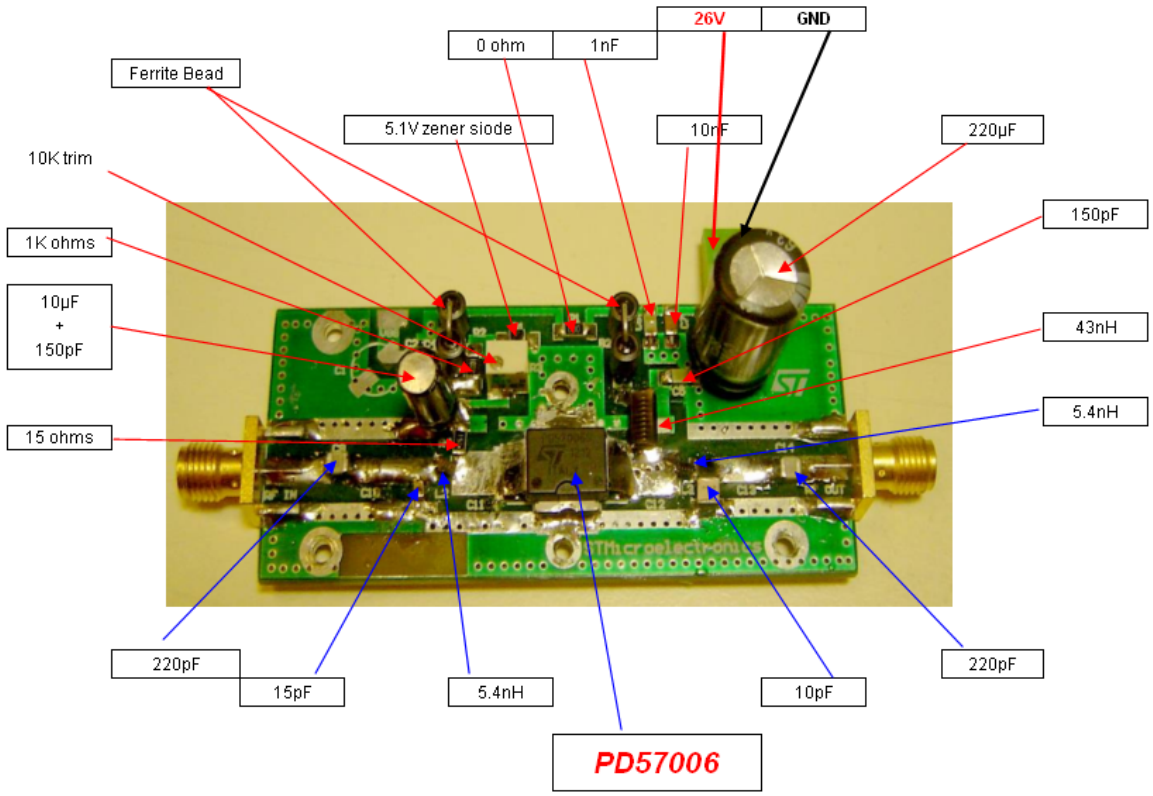
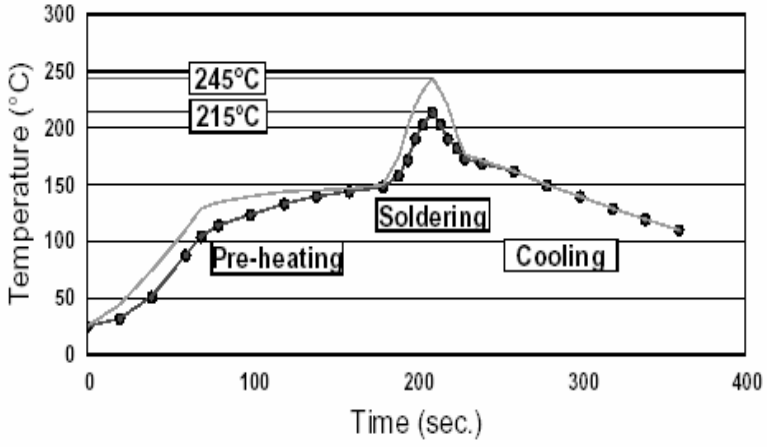


Table 5. Recommended heat profile / reflow soldering



6 Circuit layout

Table 6. Circuit layout

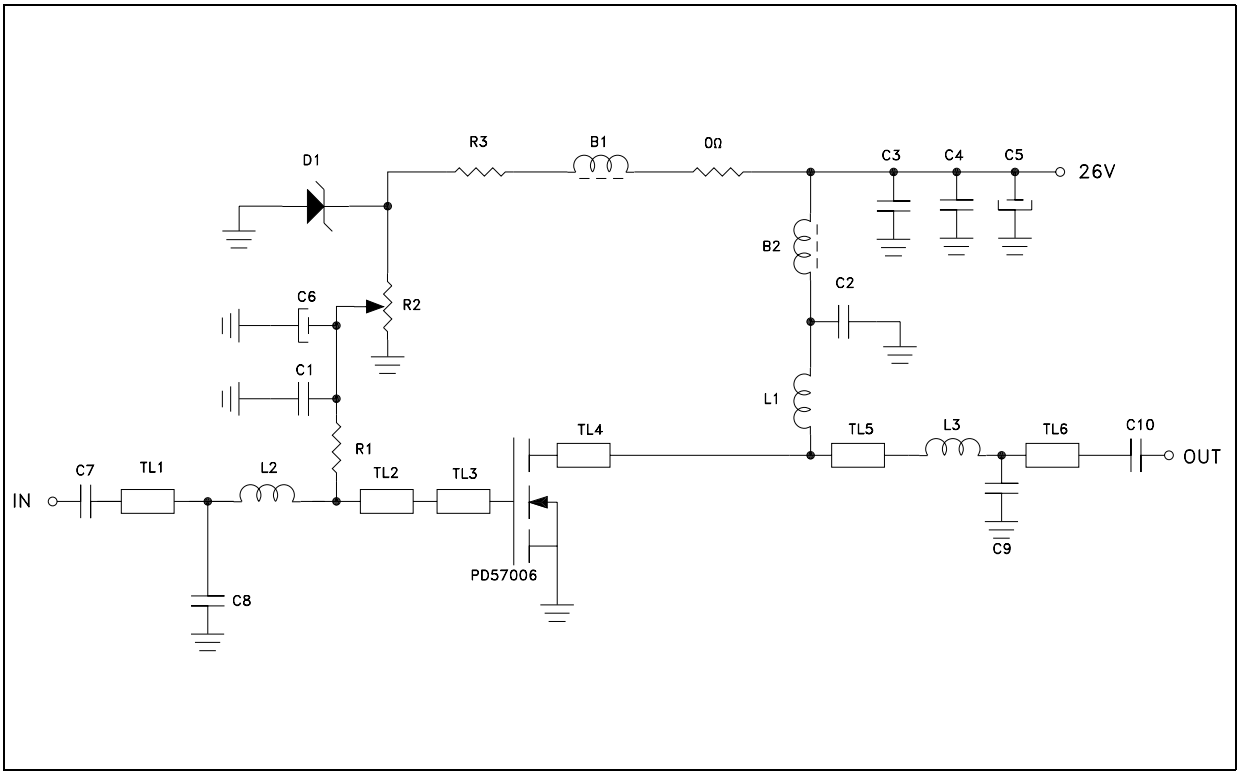


Table 7. Component part list

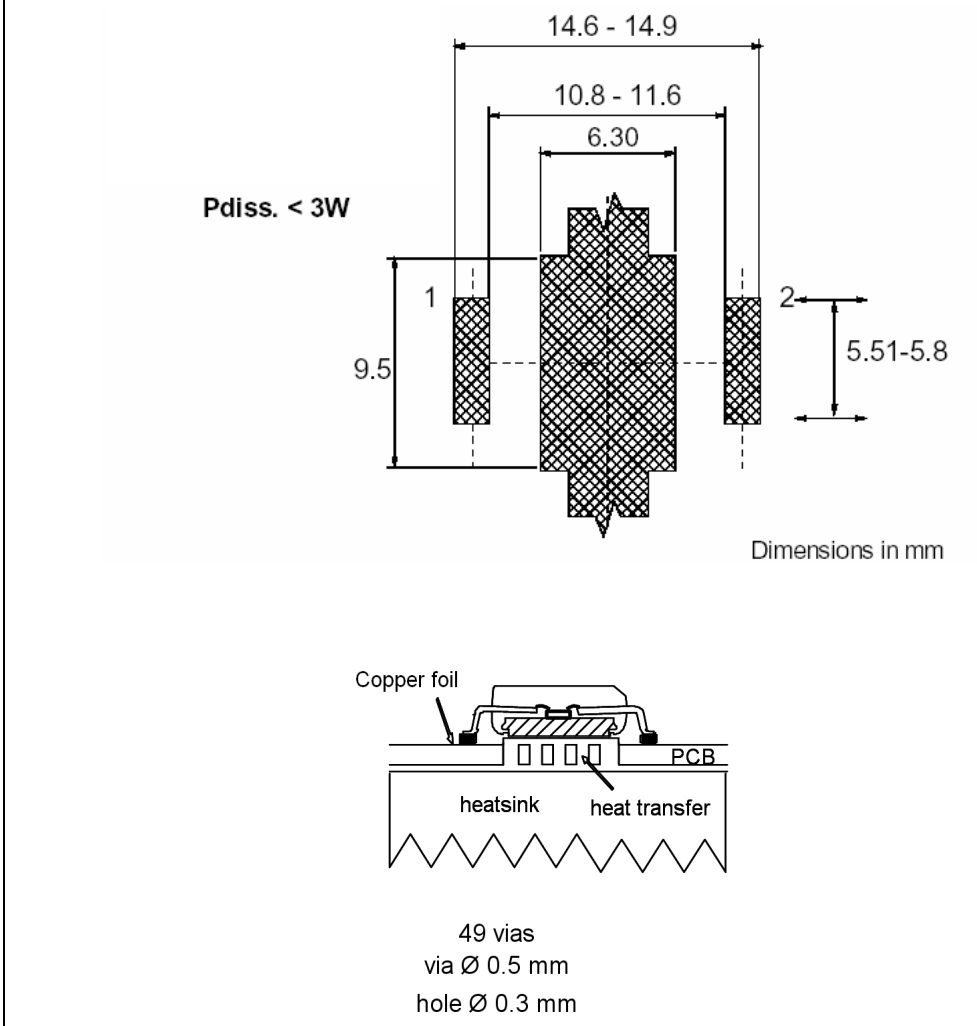
Part type	Component ID	Description	Value	Case size	Manufacturer	Part Code
CAP	C1	Capacitor	150 pF	1206	Murata	GRM42-6C0G151J50
CAP	C2	Capacitor	150 pF	1206	Murata	GRM42-6C0G151J50
CAP	C3	Capacitor	1 nF	1206	Murata	GRM42-6C0G102J50
CAP	C4	Capacitor	10 nF	1206	Murata	GRM42-6X7R104K50
Electrolytic CAP	C5	Capacitor	220µF			
Electrolytic CAP	C6	Capacitor	10µF			
CAP	C7	Capacitor	220pF	100B	ATC	221
CAP	C8	Capacitor	15pF	100B	ATC	150
CAP	C9	Capacitor	10pF	100B	ATC	100
CAP	C10	Capacitor	220pF	100B	ATC	221

Table 7. Component part list

Part type	Component ID	Description	Value	Case size	Manufacturer	Part Code
TL	TL1, TL7	Transmission Line	W = 2.87 mm L = 8 mm			
TL	TL2	Transmission Line	W = 4.9 mm L = 5 mm			
TL	TL3, TL4	Transmission Line	W = 6 mm L = 3 mm			
TL	TL5	Transmission Line	W = 4.9 mm L = 5 mm			
TL	TL6	Transmission Line	W = 2.87 mm L = 10 mm			
Ferrite Bead	B1	Ferrite Bead			PANASONIC	EXCELDRC35C
Ferrite Bead	B2	Ferrite Bead			PANASONIC	EXCELDRC35C
INDUCTOR	L1	Inductor	43nH		Coilcraft Mini Spring	B10TJ
INDUCTOR	L2	Inductor	5.4nH		Coilcraft Micro Spring	0906-5J
INDUCTOR	L3	Inductor	5.4nH		Coilcraft Micro Spring	0906-5J
TRANSISTOR	PD57006	LDMOS			STMicroelectronics	PD57006
Resistor	R1	Resistor	15Ω	1206	TYCO ELECTRONICS	01623440-1
POT	R2	Potentiometer	10 K		BOURNS ELECTRONICS	3214W-1-103E
Resistor	R3	Resistor	1K	1206	TYCO ELECTRONICS	01623440-1
SMA-CONN	RF in	SMA-CONN			Johnson	142-0701-801
SMA-CONN	RF out	SMA-CONN			Johnson	142-0701-801
ZENER	D1	Zener Diode	5.1 V	SOD110	PHILIPS	BZX284C5V1
BOARD	FR-4 THk=0.060" 2OZ Cu Both Sides					

7 Mounting indications

Figure 8. PowerSO-10 Mounting indications



8 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

Table 8. 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 9. Package dimensions

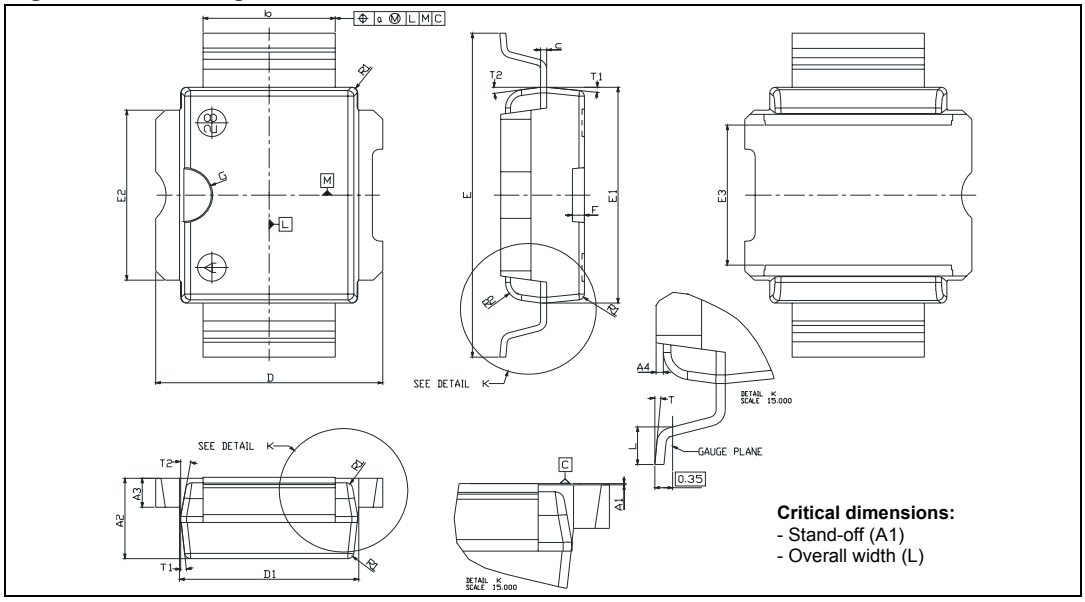
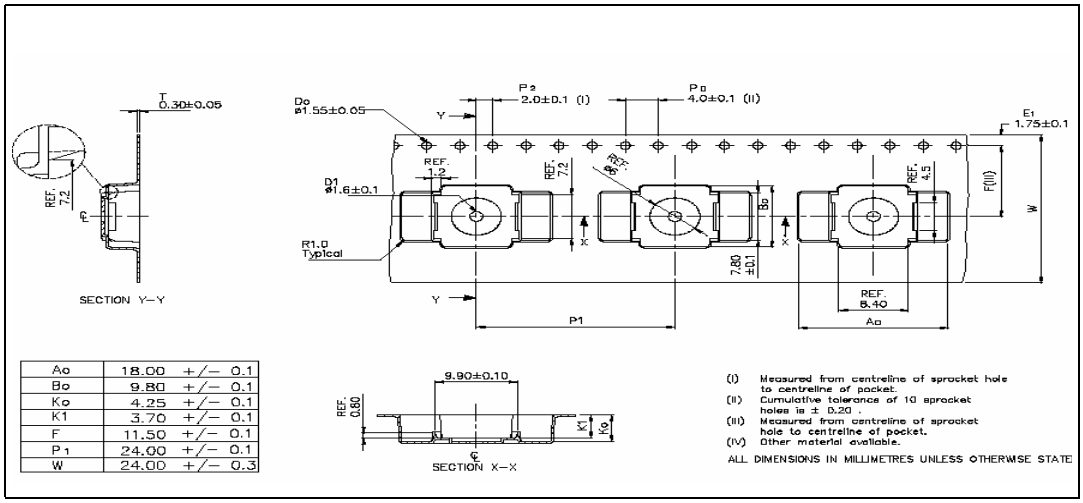


Figure 10. PowerSO-10RF Tape & reel



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

9 Revision history

Table 9. Revision history

Date	Revision	Changes
04-Nov-2006	1	Initial release

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