



AB-54008L-175

2 stages RF power amp: PD84001-E + PD54008L-E + LPF
N-Channel Enhancement-Mode Lateral MOSFETs

Feature

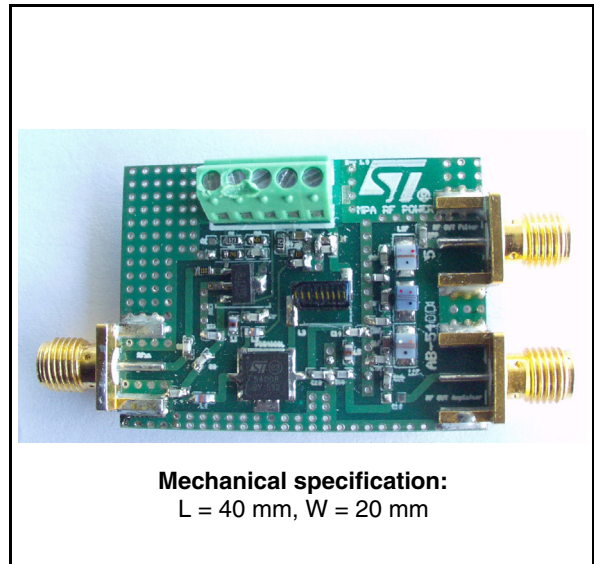
- Excellent thermal stability
- Frequency: 135 - 175MHz
- Supply voltage: 7.2V
- Output power: 5W
- Current < 1.5A
- Input power < 10dBm
- Harmonics level < -70dBc
- Load mismatch 20:1
- V_{APC} 5V max
- Beo Free Amplifier
- RoHS compliant

Description

The AB-54008L-175 is a 2 stages RF power amplifier including output Low Pass Filter for harmonics rejection specifically designed for 2 Ways Comms VHF portable.

Order code

- AB-54008L-175



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1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	15	V
I_D	Drain current	2.5	A
T_{CASE}	Operating case temperature	-20 to +85	°C
T_A	Max. ambient temperature	+55	°C

2 Electrical characteristics

$T_A = +25\text{ °C}$, $V_{DD} = 7.2\text{ V}$, V_{APC} Adjusted

Table 2. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
FREQ	Frequency range	135		175	MHz
P_{IN}	@ $P_{OUT} = 5W$	5		10	dBm
I_{TOTAL}	@ $P_{OUT} = 5W$ and $P_{IN} = 8dBm$			1.5	A
PAE	@ $P_{OUT} = 5W$ and $P_{IN} = 8dBm$	47% - 52%			
VAPC	@ $P_{OUT} = 5W$ and $P_{IN} = 8dBm$		4	5	V
Harmonics	@ $P_{OUT} = 5W$			-70	dBc

3 Typical performance

Figure 1. Current vs frequency

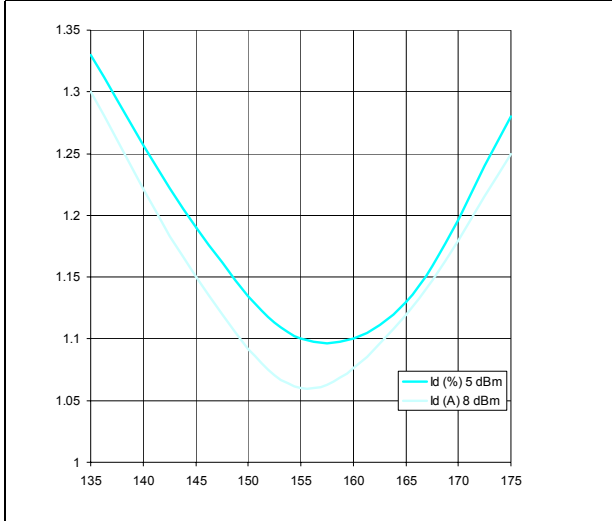


Figure 2. Efficiency vs frequency

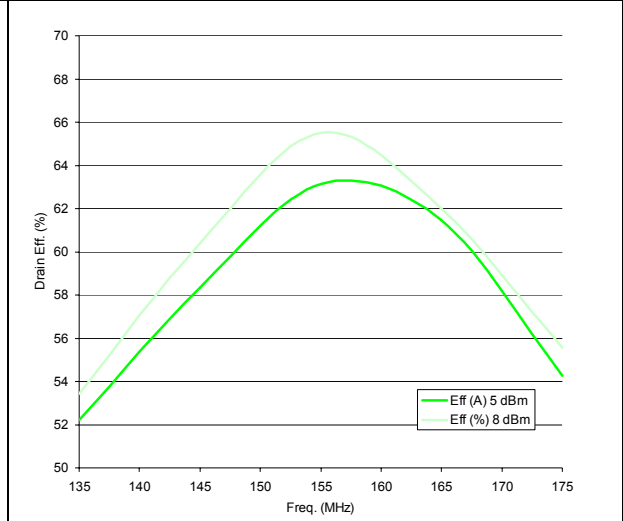


Figure 3. Gain vs frequency

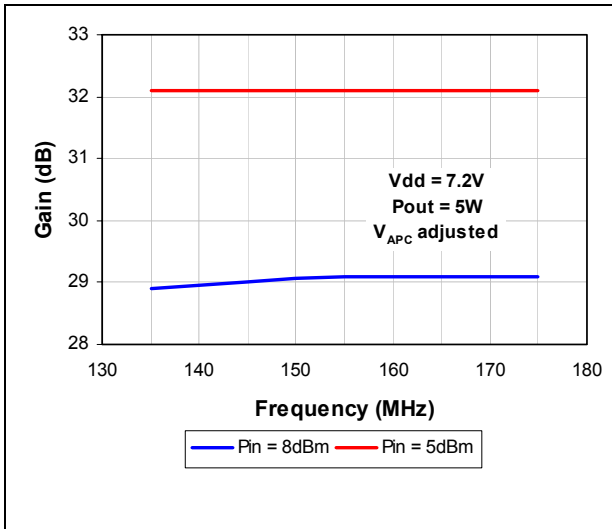


Figure 4. Gain vs input power

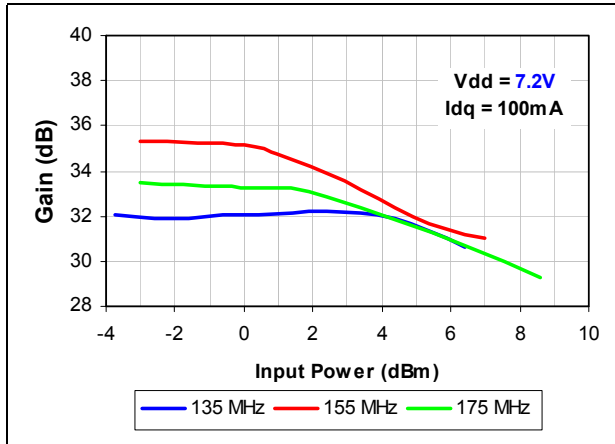


Figure 5. Gain vs input power

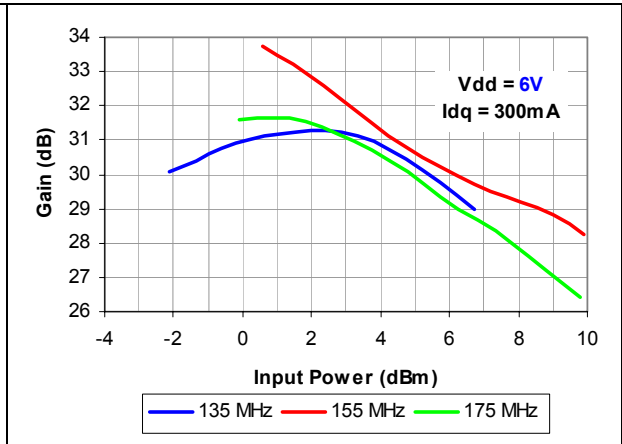


Figure 6. Gain vs input power

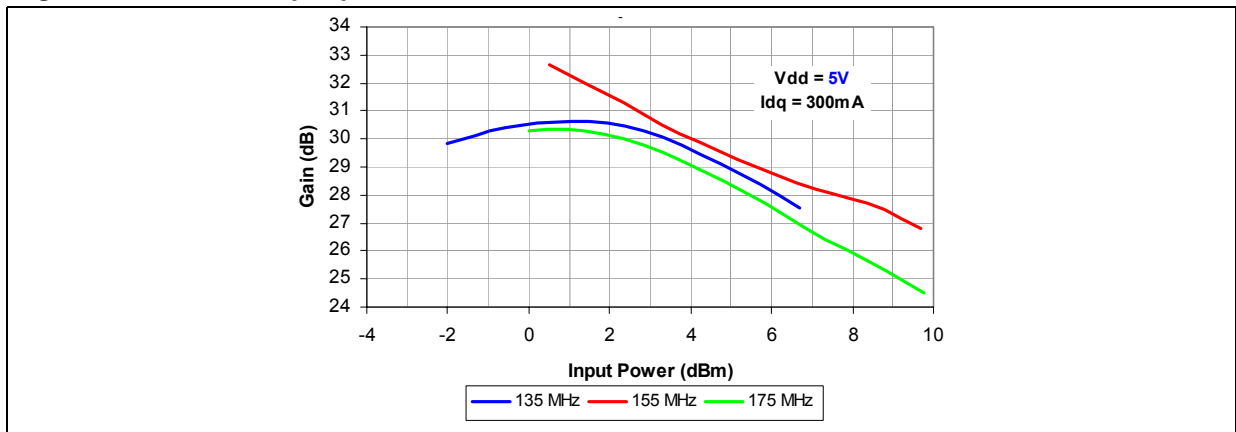


Figure 7. Drain current vs output power

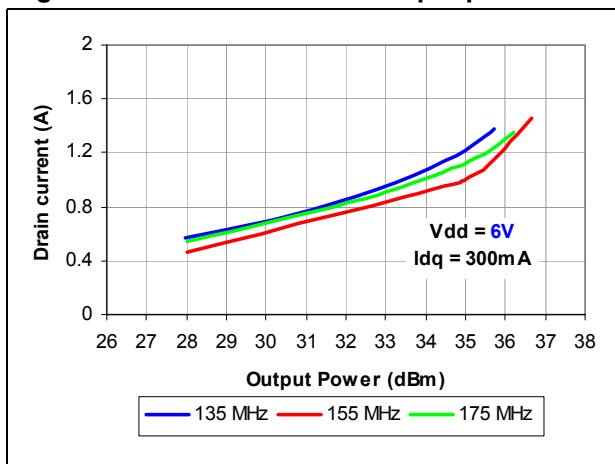


Figure 8. Drain current vs output power

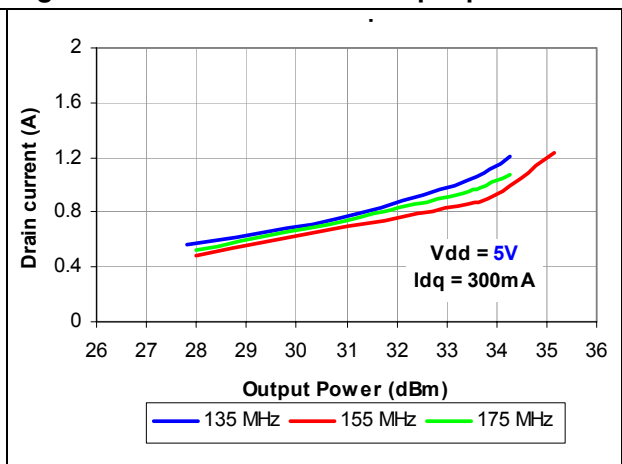


Figure 9. S21 response - Low pass filter

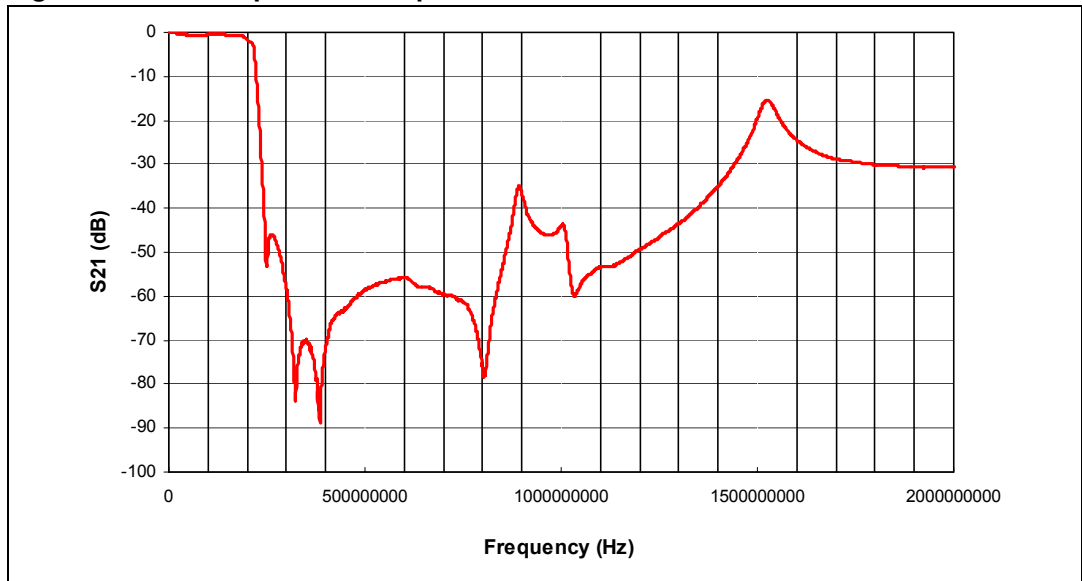


Table 3. Part list

Designator	Manufacturer	Size	Value	Comment	Part Code
C1, C5, C16	Murata	0603	nc	Capacitor	
C6	Murata	0603	1uF	Capacitor	
C1F	Murata	0603	3.3pF	Capacitor	GRM1885C1H3R3CZ01
C2, C3, C4, C7, C8, C9, C10	Murata	0603	330pF	Capacitor	GRM1885C1H391JA01
C2F	Murata	0603	18pF	Capacitor	GRM1885C1H180JA01
C3F	Murata	0603	12pF	Capacitor	GRM1885C1H120JA01
C4F, C6F	Murata	0603	22pF	Capacitor	GRM1885C1H220JA01
C5F, C12	Murata	0603	27pF	Capacitor	GRM1885C1H270JA01
C7F	Murata	0603	15pF	Capacitor	GRM1885C1H150JA01
C11	Murata	0603	56pF	Capacitor	GRM1885C1H560JA01
C13	Murata	0603	33pF	Capacitor	GRM1885C1H330JA01
C14	Murata	0603	100pF	Capacitor	GRM1885C1H101JA01
C15	Murata	0603	39pF	Capacitor	GRM1885C1H390JA01
DC-CON1	Phoenix Contact	2.54mm , 5 pole		DC connector	1725685
L1	Coilcraft	1812	24nH	Inductor	1812SMS-33NJ
L1F	Coilcraft	1008	39nH	Inductor	1008CS-390NX_BW
L2	Coilcraft	1812	33nH	Inductor	1812SMS-33NJ
L2F	Coilcraft	1008	22nH	Inductor	1008CS-220NX_BW
L3	Coilcraft	1812	35.5nH	Inductor	1812SMS-22NJ
L3F	Coilcraft	1008	27nH	Inductor	1008CS-270NX_BW
L4	Coilcraft	0603	18nH	Inductor	0603HC-18NX_BW
L5	Coilcraft	Minispring A	18.5nH	Inductor	A05T
PD54008L-E	STMicroelectronics	QFN 5x5		N-Channel Enhancement	PD54003L
PD84001-E	STMicroelectronics	SOT89		N-Channel Enhancement	PD84001
R1, R4	Tyco/Electronics Neohm	0603	62KΩ	Resistor	CRG Series Thick Film
R2	Tyco/Electronics Neohm	0603	430KΩ	Resistor	CRG Series Thick Film
R3	Tyco/Electronics Neohm	0603	240Ω	Resistor	CRG Series Thick Film
R5	Tyco/Electronics Neohm	0603	150KΩ	Resistor	CRG Series Thick Film
R6	Tyco/Electronics Neohm	0603	11Ω	Resistor	CRG Series Thick Film

Table 3. Part list (continued)

Designator	Manufacturer	Size	Value	Comment	Part Code
RFin, RF OUT Amplifier, RF OUT Filter	Johnson			SMA	142-0701-801
Substrate		H = 20mil ; h = 2oz		Substrate	FR-4
TL1		W = 0.92mm ; L = 3mm	Z = 50Ω	Transmission Line	
TL2		W = 0.92mm ; L = 7.2mm	Z = 50Ω	Transmission Line	
TL3		W = 0.92mm ; L = 6.23mm	Z = 50Ω	Transmission Line	
TL4		W = 0.92mm ; L = 6.62mm	Z = 50Ω	Transmission Line	
TL5		W = 0.92mm ; L = 5.8mm	Z = 50Ω	Transmission Line	
TL6		W = 0.92mm ; L = 2.2mm	Z = 50Ω	Transmission Line	
TL7		W = 0.92mm ; L = 11mm	Z = 50Ω	Transmission Line	
TL8		W = 0.92mm ; L = 12.4mm	Z = 50Ω	Transmission Line	
TL9		W = 0.92mm ; L = 2mm	Z = 50Ω	Transmission Line	

4 Circuit layout

Figure 10. Test fixture component layout

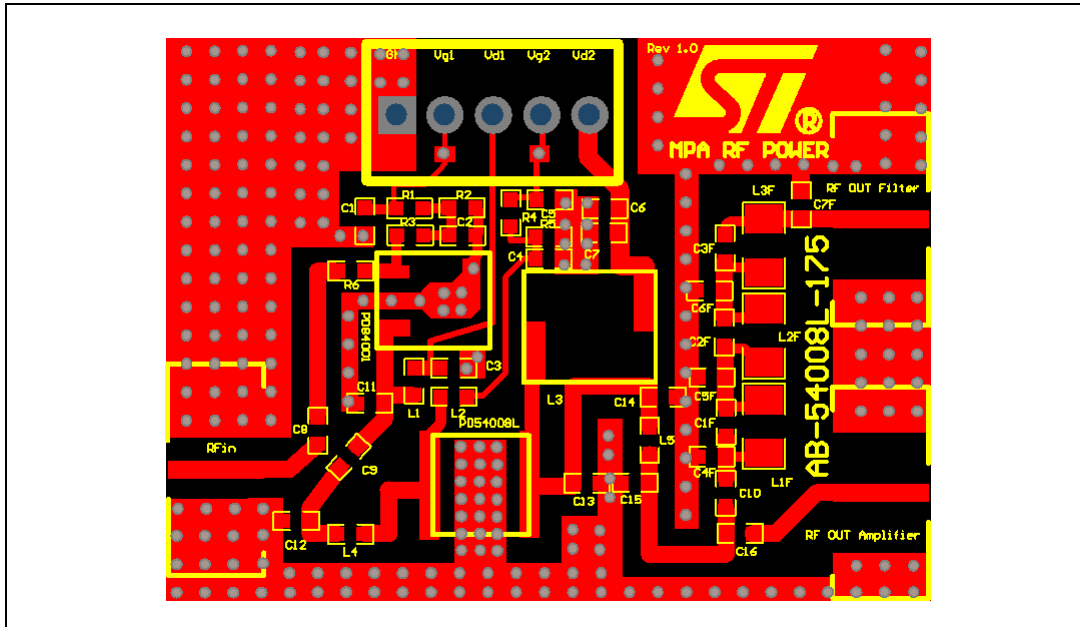
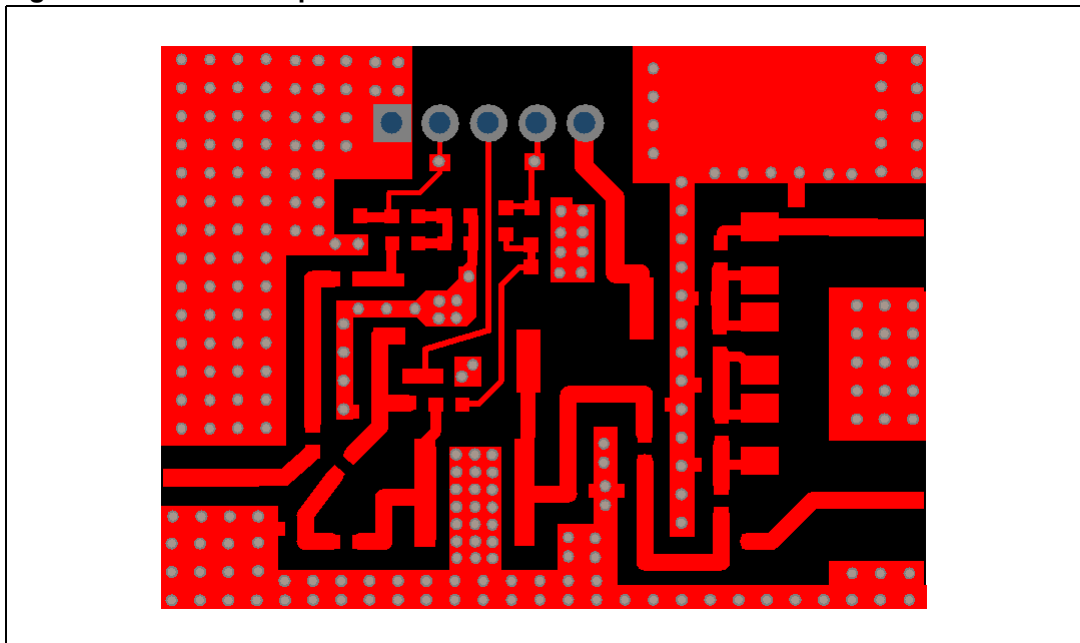


Figure 11. test circuit photomaster



5 Circuit schematic

Figure 12. Circuit schematic

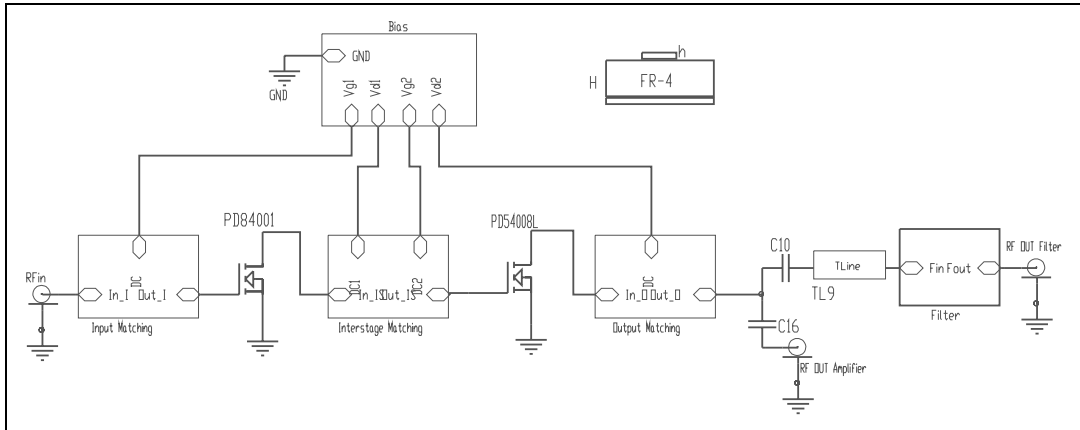


Figure 13. Bias schematic

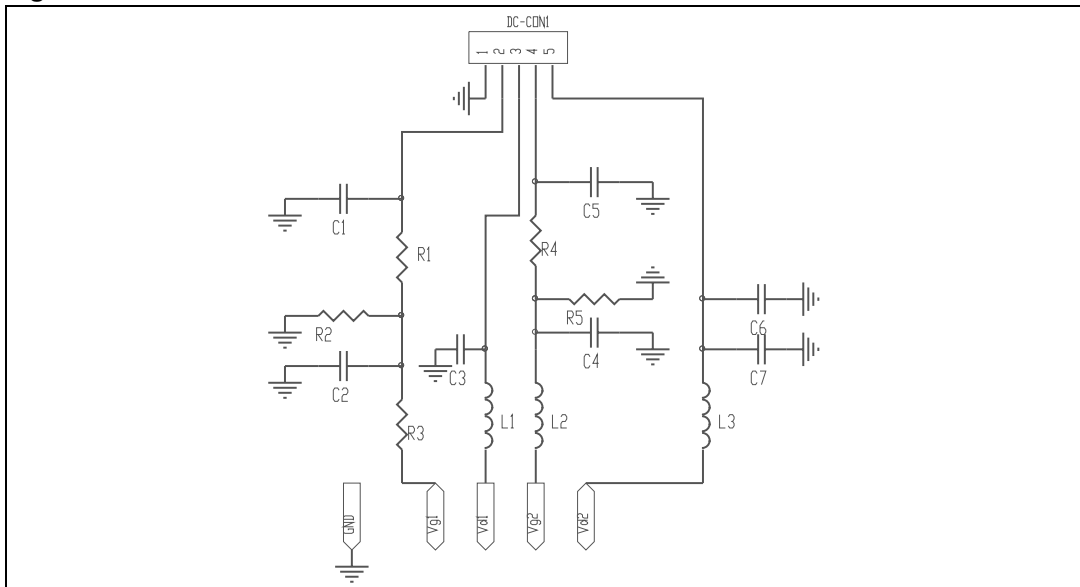


Figure 14. Filter schematic

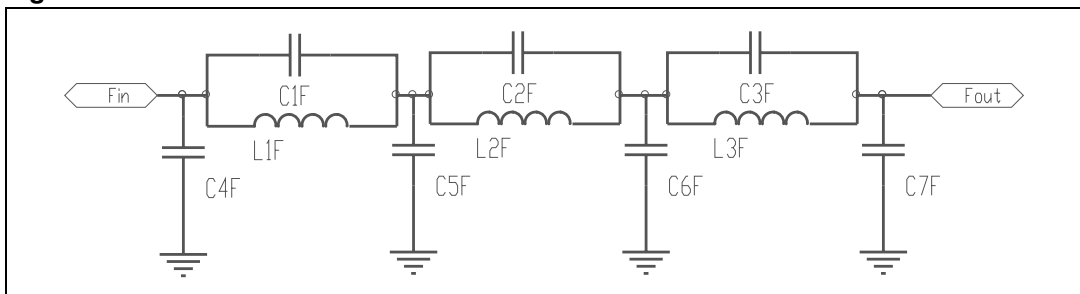


Figure 15. Input matching schematic

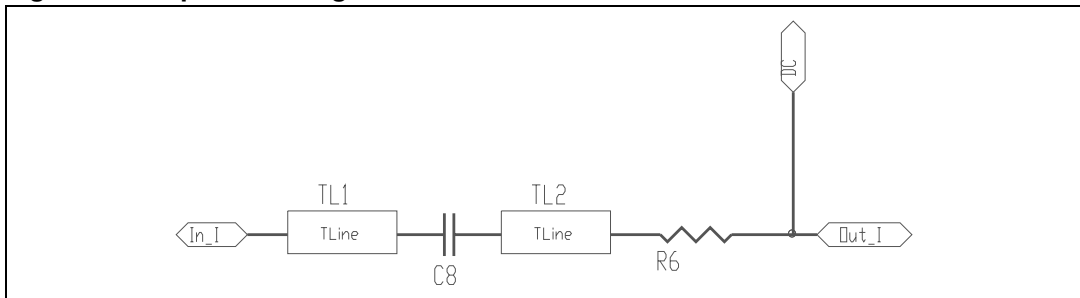


Figure 16. Inter matching schematic

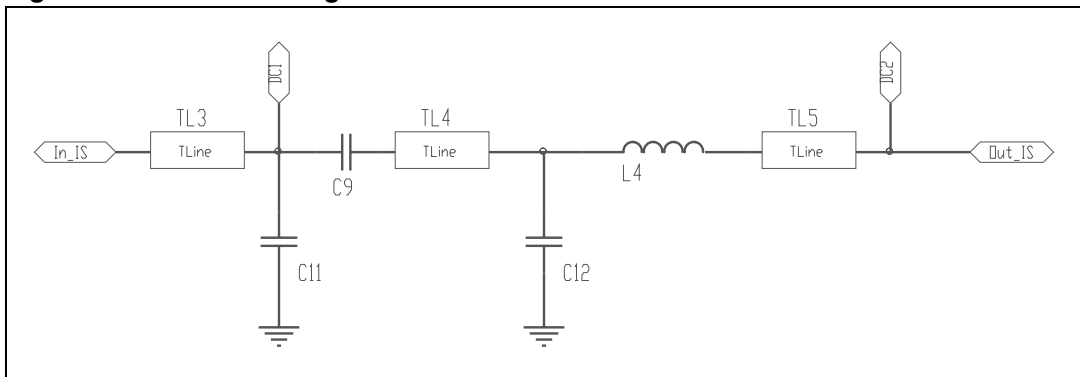
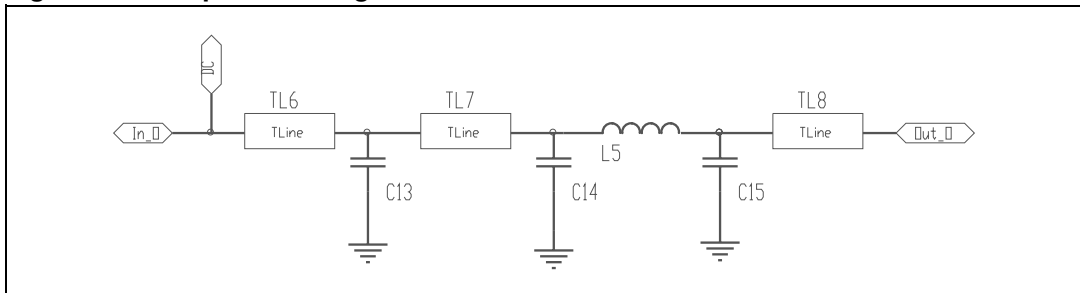


Figure 17. Output matching schematic



6 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

6.1 PowerFLAT™ Mechanical data

Table 4. PowerFLAT™ Mechanical data

Dim.	mm			inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		0.90	1.00		0.035	0.039
A1		0.02	0.05		0.001	0.002
A3		0.24			0.009	
AA	0.15	0.25	0.35	0.006	0.01	0.014
b	0.43	0.51	0.58	0.017	0.020	0.023
c	0.64	0.71	0.79	0.025	0.028	0.031
D		5.00			0.197	
d		0.30			0.011	
E		5.00			0.197	
E2	2.49	2.57	2.64	0.098	0.101	0.104
e		1.27			0.050	
f		3.37			0.132	
g		0.74			0.03	
h		0.21			0.008	

Figure 18. PowerFLAT™ Package dimensions

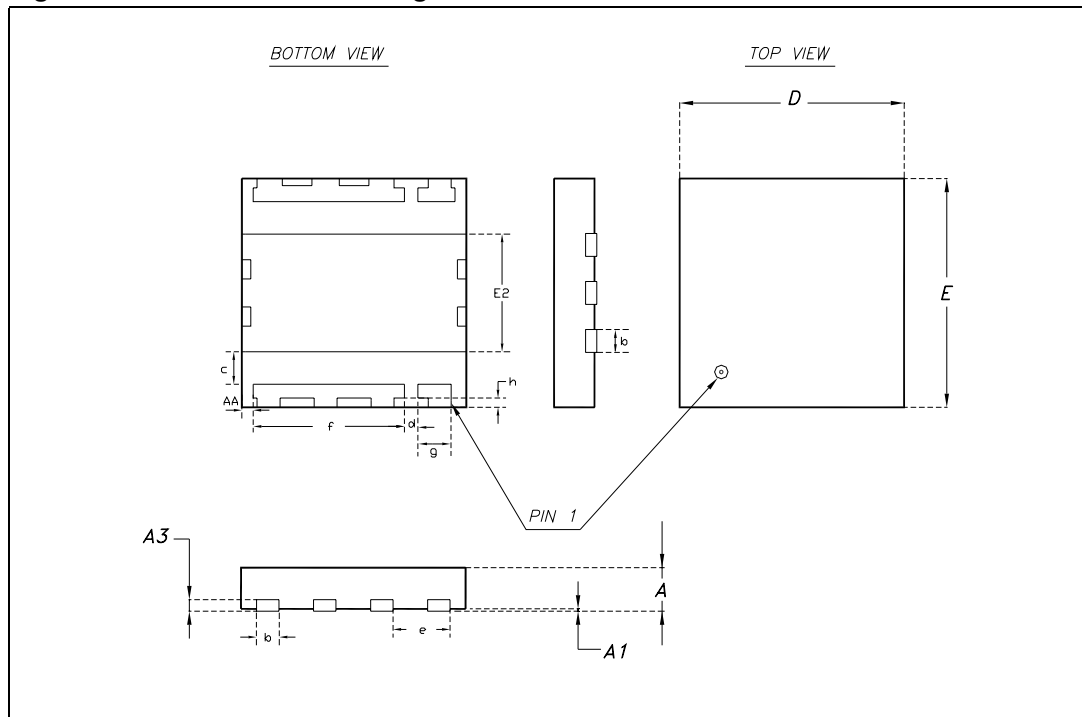
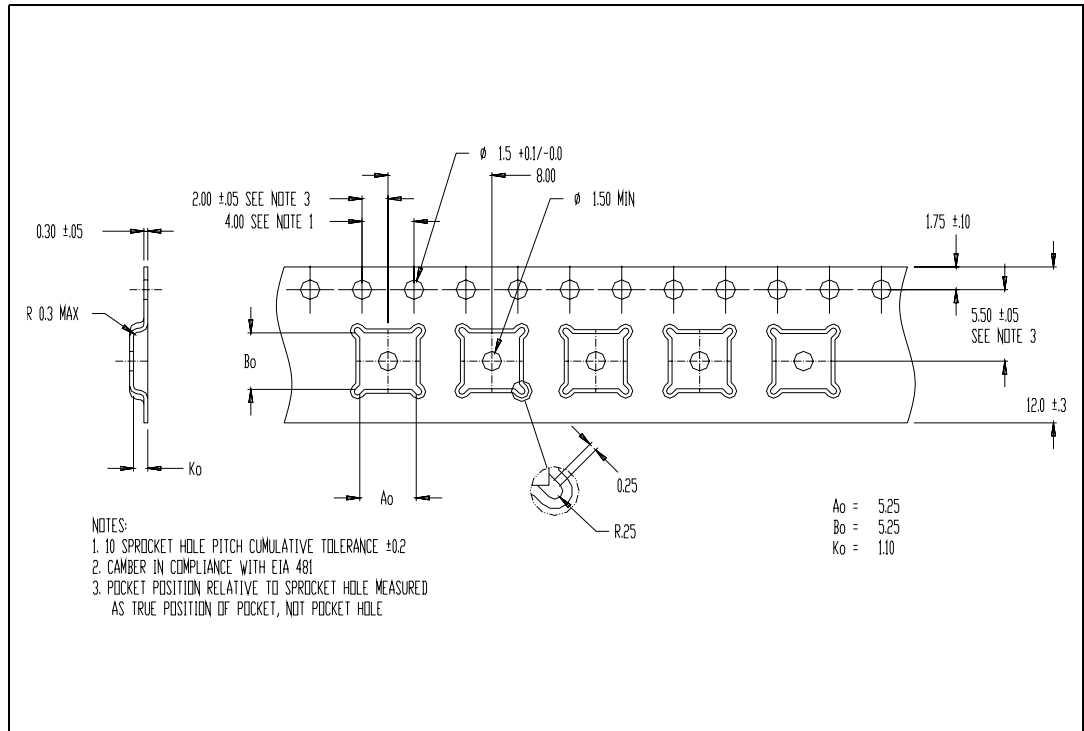


Table 5. PowerFLAT™ Tape & reel dimensions

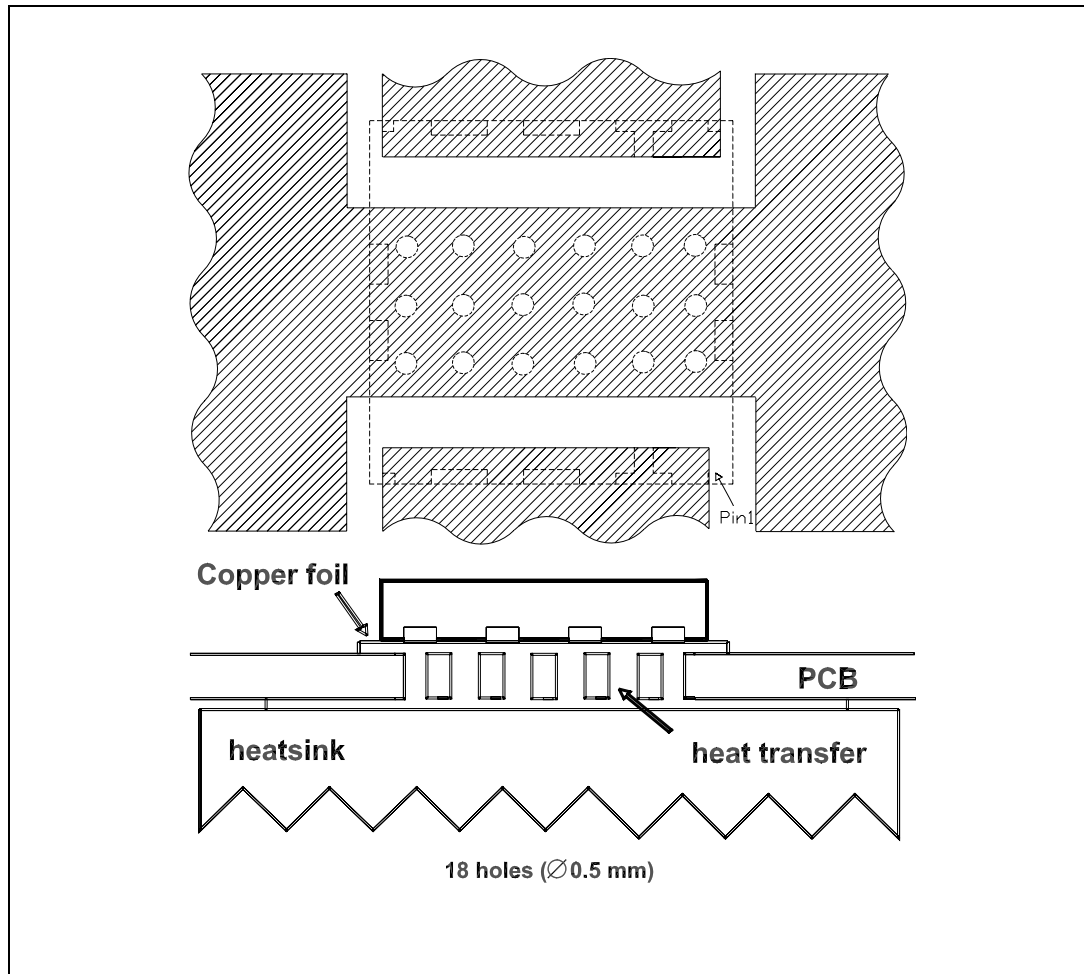
Dim.	mm.			inch		
	Min.	Typ	Max.	Min.	Typ	Max.
Ao	5.15	5.25	5.35	0.12	0.13	0.13
Bo	5.15	5.25	5.35	0.12	0.13	0.13
Ko	1.0	1.1	1.2	0.02	0.02	0.02

Figure 19. PowerFLAT™ Tape & reel



6.1.1 Mounting indications

Figure 20. Standard SMD mounting

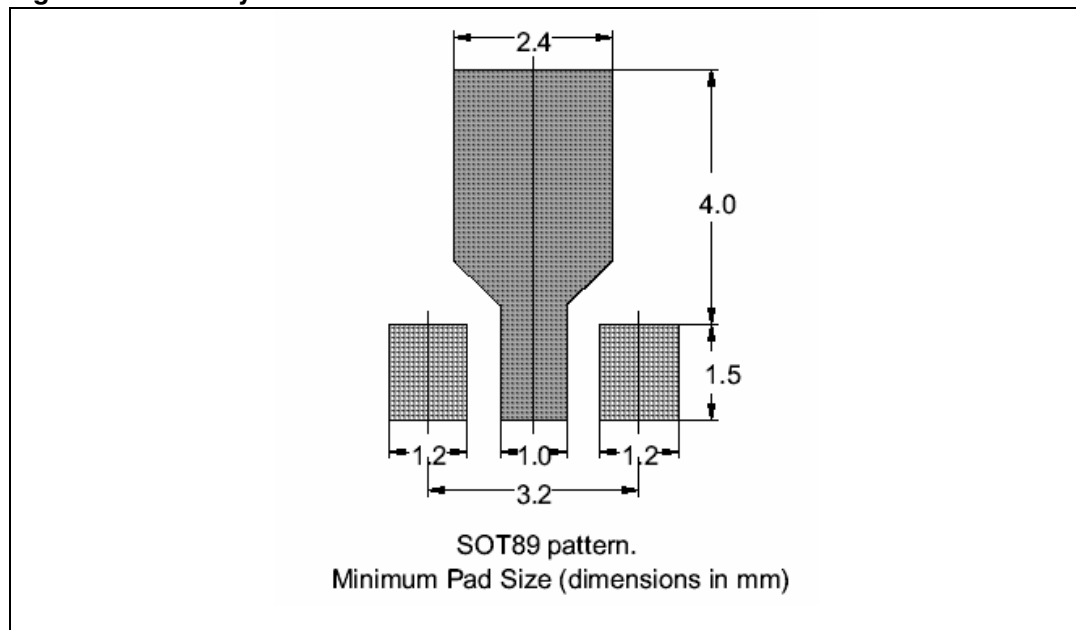


6.2 Thermal Pad and Via design SOT-89

Thermal vias are required in the PCB layout to effectively conduct heat away from the package. The via pattern has been designed to address thermal, power dissipation and electrical requirements of the device.

The via pattern is based on thru-hole vias with 0.203mm to 0.330mm finished hole size on a 0.5mm to 1.2mm grid pattern with 0.025 plating on via walls. If micro vias are used in a design, it is suggested that the quantity of vias be increased by a 4:1 ratio to achieve similar results.

Figure 21. Pad layout details



6.2.1 Soldering profile

Figure 22 shows the recommended solder for devices that have Pb-free terminal plating and where a Pb-free solder is used.

Figure 22. Recommended solder profile

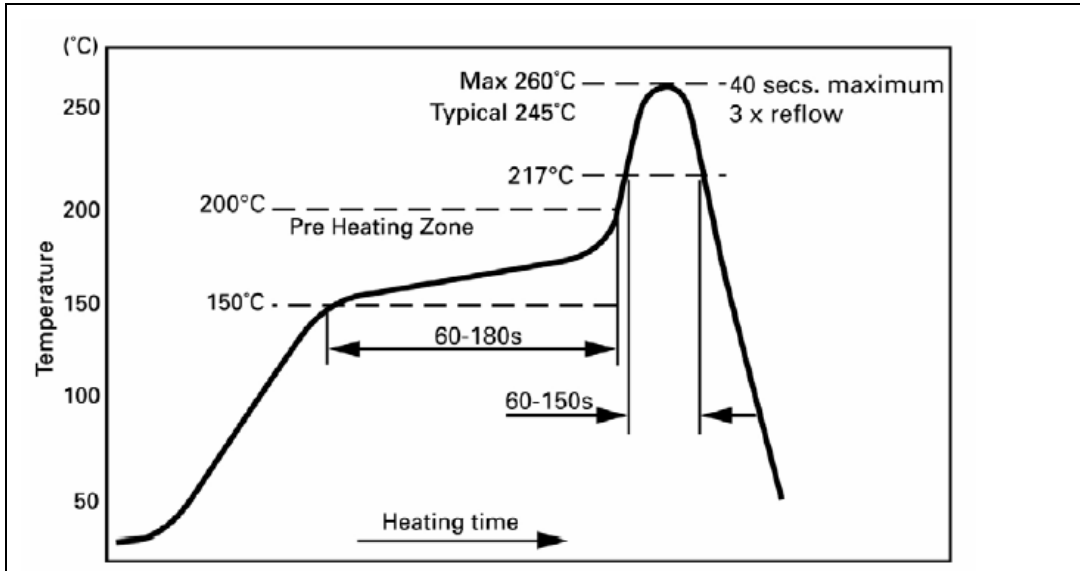


Figure 23 shows the recommended solder for devices with Pb-free terminal plating used with leaded solder, or for devices with leaded terminal plating used with a leaded solder.

Figure 23. Recommended solder profile for leaded devices

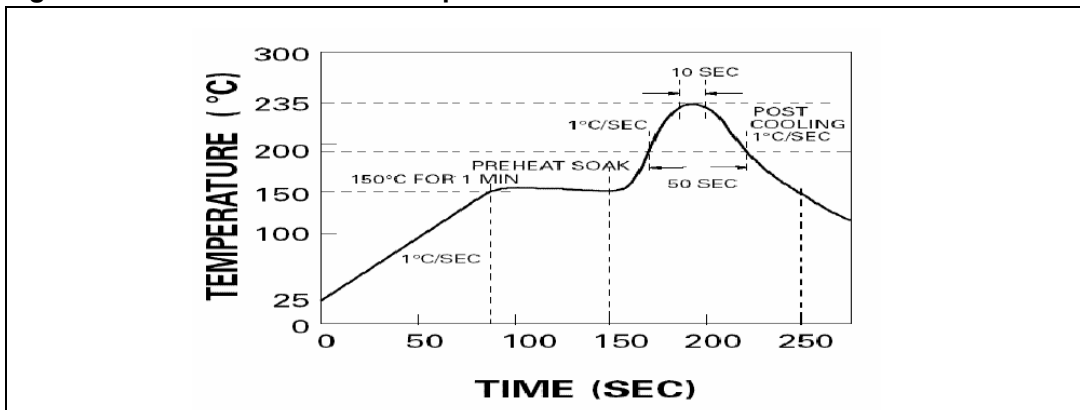
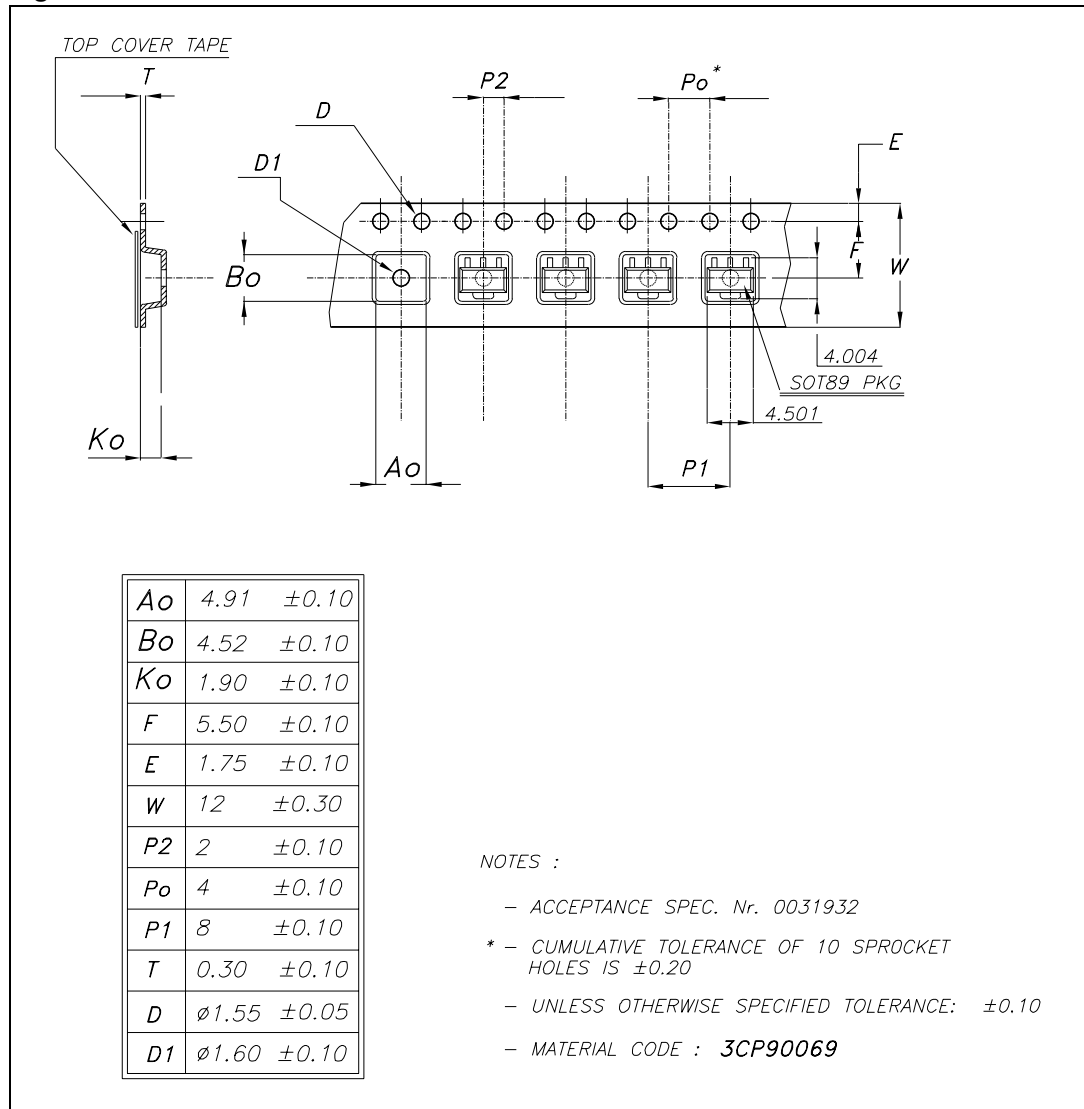


Figure 24. Reel information



7 Revision history

Table 6. Revision history

Date	Revision	Changes
21-Nov-2006	1	Initial release.
23-Apr-2007	2	Updated component part list

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