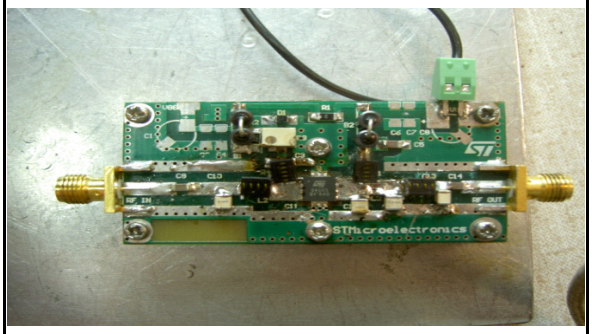
DB-54003L-175

RF POWER Amplifier using 1 x PD54003L N-Channel Enhancement-Mode Lateral MOSFETs

General feature

- Excellent Thermal Stability
- Frequency: 135 - 175 MHz
- Supply Voltage: 7.5V
- Output Power: > 5W
- Efficiency: 64% - 73%
- Load Mismatch: 20:1
- Beo Free Amplifier



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

Description

The DB-54003L-175 is a common source N-Channel Enhancement-Mode Lateral Field Effect RF power amplifier designed for 2 Ways Comms VHF portable.

Order code

- DB-54003L-175

Contents

1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply Voltage	16	V
I_D	Drain Current	1.6	A
T_{CASE}	Operating Case Temperature	-20 to +85	°C
T_A	Max. Ambient Temperature	+55	°C

2 Electrical characteristics

T_A = +25 ^{o}C, V_{DD} = 7.5 V, I_{dq} = 100 mA

Table 2. Electrical specification

Symbol	Test Conditions	Min.	Typ.	Max.	Unit
FREQ	Frequency Range	135		175	MHz
P_{OUT}		5	5,5		W
Gain	@ P_{OUT} = 5W		16.3 $\pm$ 0.7		dB
ND	@ P_{OUT} = 5W		64 - 73		%
H2	2^{ND} Harmonic @ P_{OUT} = 5W		-26 / -36		dBc
H3	3^{RD} Harmonic @ P_{OUT} = 5W		-35 / -49		dBc
VSWR	Load Mismatch all phases @ P_{OUT} = 5W			20:1	

3 Impedance

Figure 1. Impedance graphic

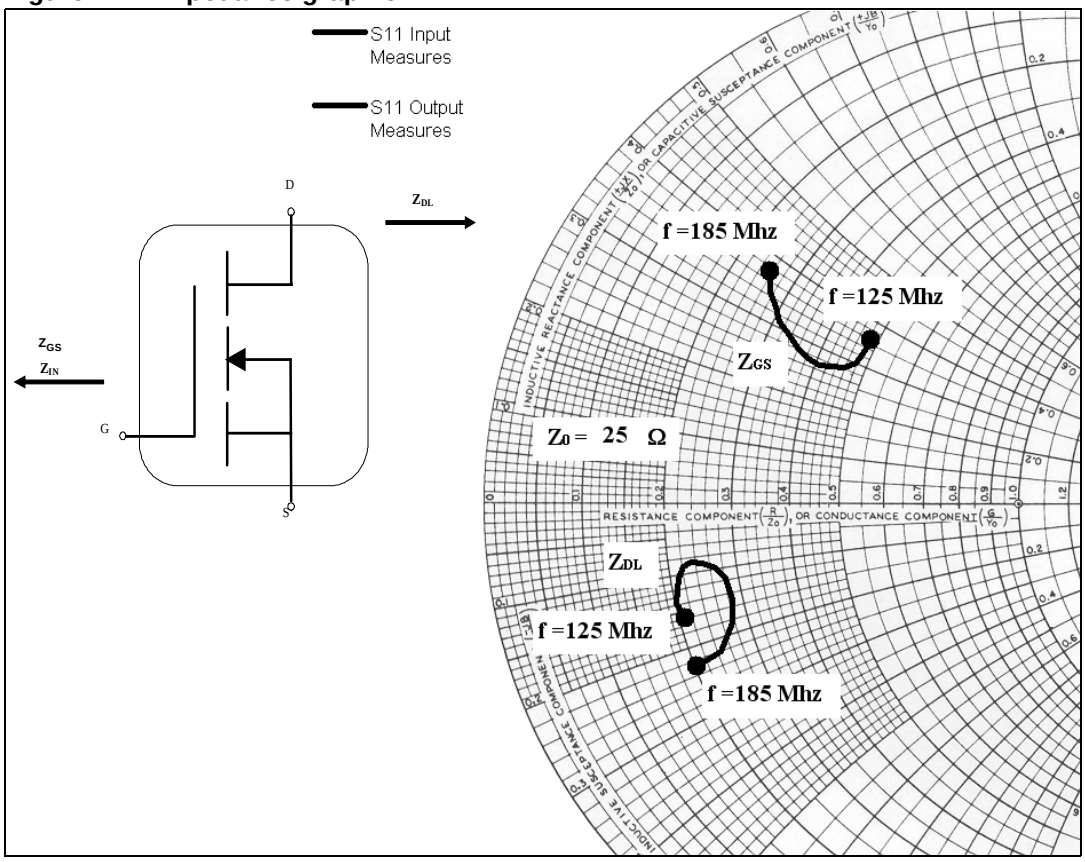


Table 3. Impedance data

F(MHz)	Z_{GS}	Z_{DL}
130	11.8 + j8.2	5.0 - j3.4
135	11.7 + j7.5	5.1 - j2.9
140	11.2 + j7.1	5.2 - j2.5
145	10.6 + j7.0	5.4 - j2.1
150	10.0 + j6.8	5.7 - j2.0
155	9.3 + j6.8	6.1 - j2.1
160	8.7 + j7.1	6.6 - j2.4
165	8.2 + j7.5	6.9 - j2.8
170	7.6 + j7.8	7.0 - j3.7
175	7.1 + j8.3	6.7 - j4.6
180	6.6 + j8.7	6.9 - j5.5

4 Typical performance

Figure 2. Output power vs. input power

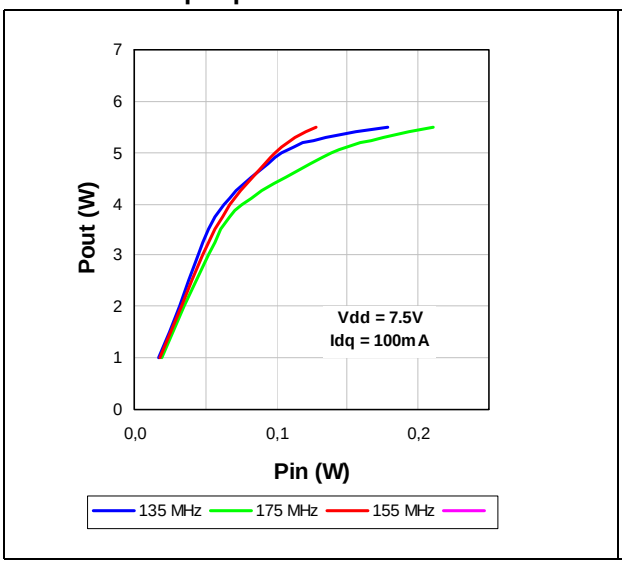


Figure 3. Gain & efficiency vs. output power

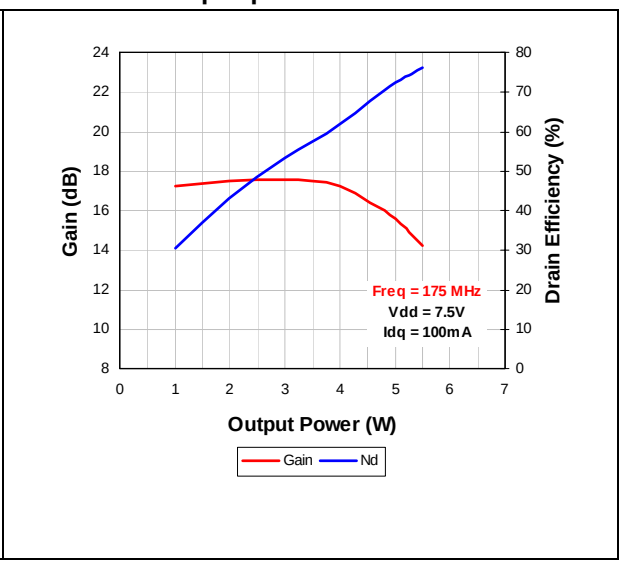


Figure 4. Gain & efficiency vs. output power

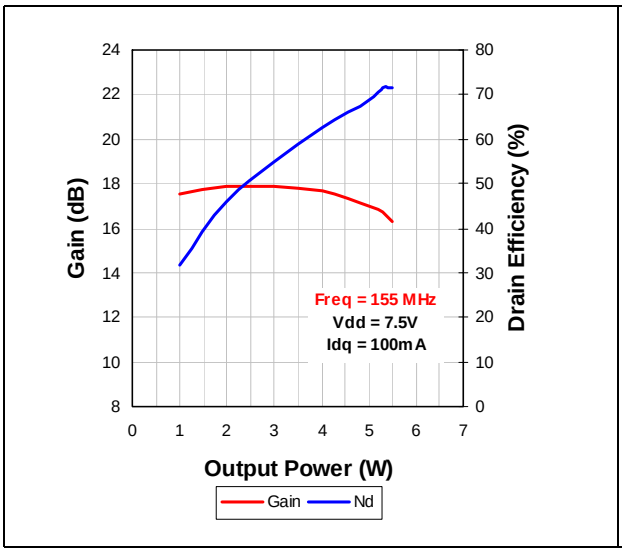


Figure 5. Gain & efficiency vs. output power

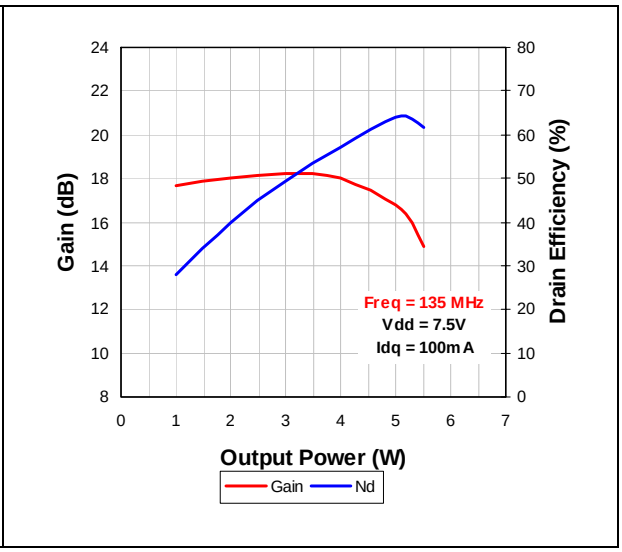


Figure 6. Power gain & efficiency vs. frequency

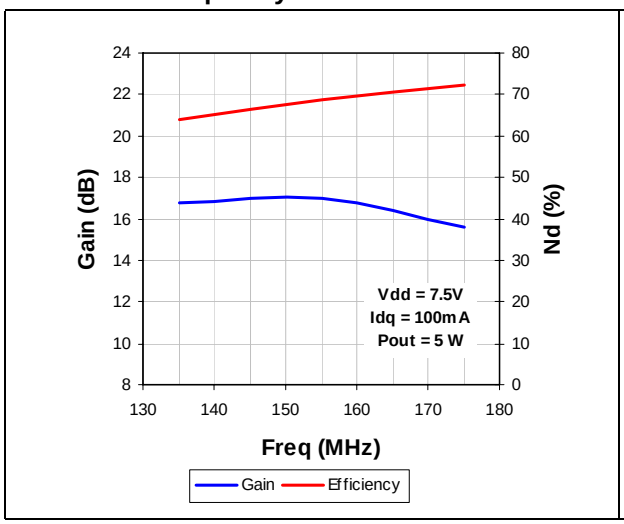


Figure 7. Power gain & efficiency vs. frequency

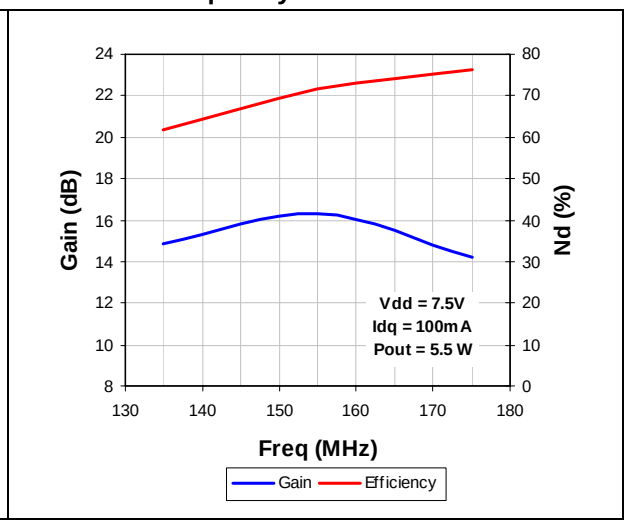


Figure 8. Harmonics vs. frequency

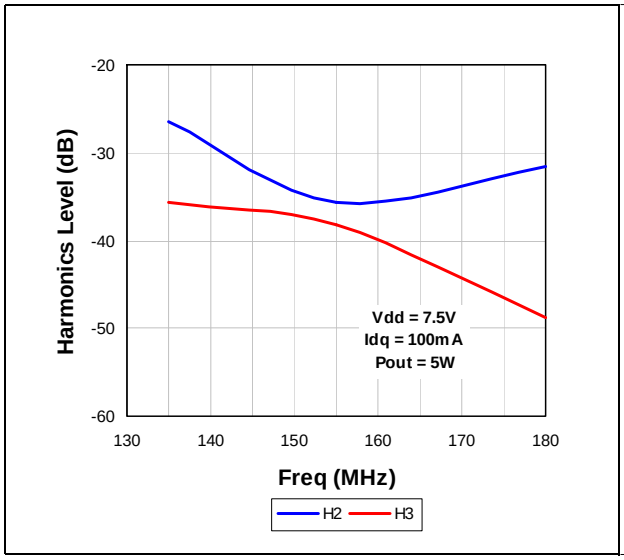


Figure 9. Input return loss vs. frequency

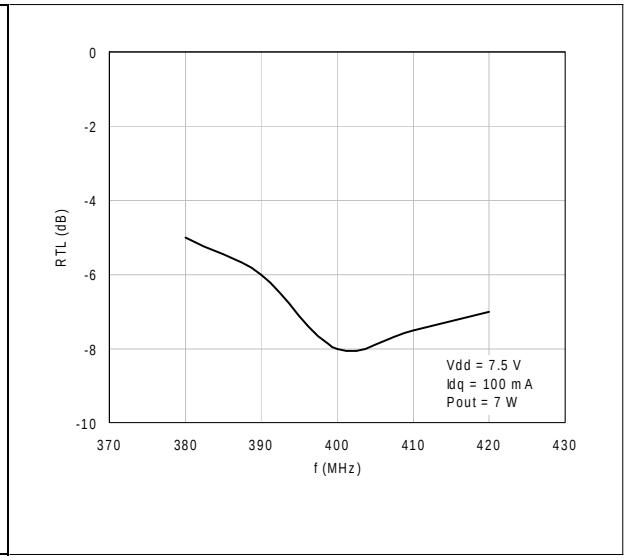
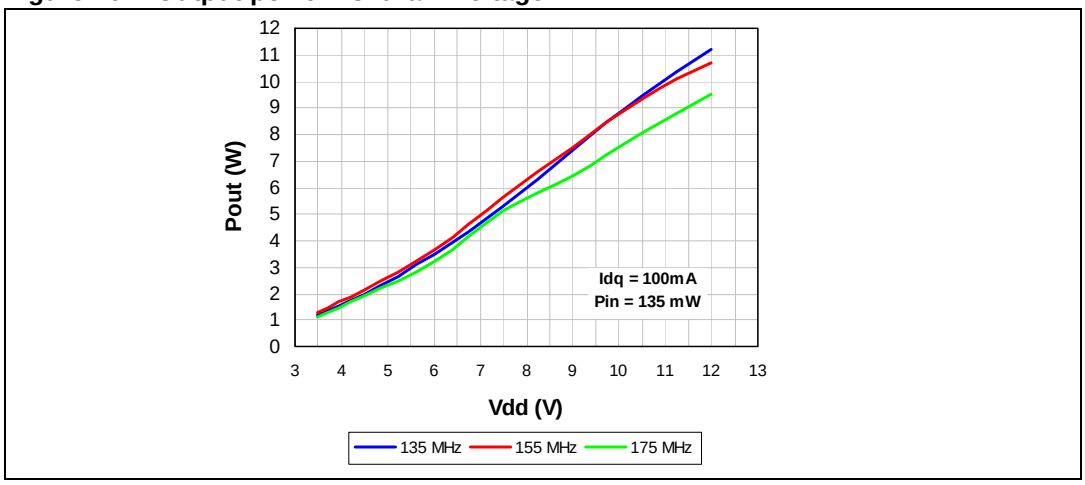


Figure 10. Output power vs. drain voltage



5 Test circuit

Table 4. Test circuit schematic

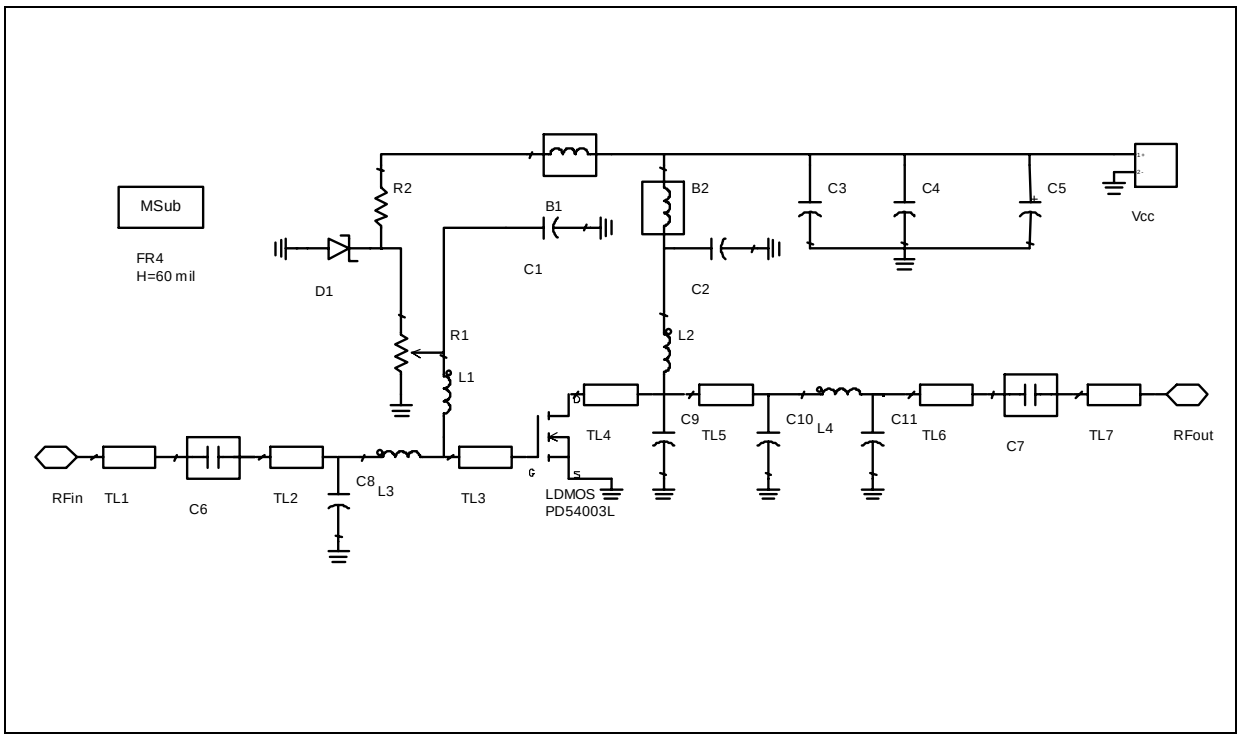


Table 5. Components part list for DB-54003L-175A

Component ID	Description	Value	Case size	Manufacturer	Part Code
B1	Ferrite Bead			PANASONIC	EXCELDRC35C
B2	Ferrite Bead			PANASONIC	EXCELDRC35C
C1, C2	Capacitor	120pF	1206	MURATA	GRM42-6C0G121J50
C3	Capacitor	1nF	1206	MURATA	GRM42-6C0G102J50
C4	Capacitor	10nF	1206	MURATA	GRM42-6X7R104K50
C5	Capacitor	10uF	SMT	PANASONIC	EEVHB1V100P
C6, C7	Capacitor	220pF	1206	MURATA	GRM42-6C0G221J50
C8	Capacitor	30pF	100B	ATC	300
C9	Capacitor	51pF	100B	ATC	510
C10	Capacitor	91pF	100B	ATC	910
C11	Capacitor	39pF	100B	ATC	390
D1	Zener Diode	5.1V	SOD110	PHILIPS	BZX284C5V1
L1	Inductor	33nH		COILCRAFT	1812SMS-33
L2	Inductor	33nH		COILCRAFT	1812SMS-33

Table 5. Components part list for DB-54003L-175A

Component ID	Description	Value	Case size	Manufacturer	Part Code
L3, L4	Inductor	22nH		COILCRAFT	1812SMS-22
R1	Potentiometer	10KΩ		BOURNS ELECTRONICS	3214W-1-103E
R2	Resistor	1K	1206	TYCO ELECTRONICS	01623440-1
TL1	Transmission Line	W=2.87mm	L=8.6mm		
TL2	Transmission Line	W=2.87mm	L=9.8mm		
TL3	Transmission Line	W=4.9mm	L=5.4mm		
TL4	Transmission Line	W=4.9mm	L=5.9mm		
TL5	Transmission Line	W=2.87mm	L=4.7mm		
TL6	Transmission Line	W=2.87mm	L=4.2mm		
TL7	Transmission Line	W=2.87mm	L=7.5mm		
RF in, RF out	SMA-CONN	50 Ω	60mils	JOHNSON	142-0701-801
PD54003L	LDMOS			STMicroelectronics	PD54003L
Board	FR-4 THk = 0.060" 2OZ Cu Both Sides				

6 Circuit layout

Figure 11. Circuit layout

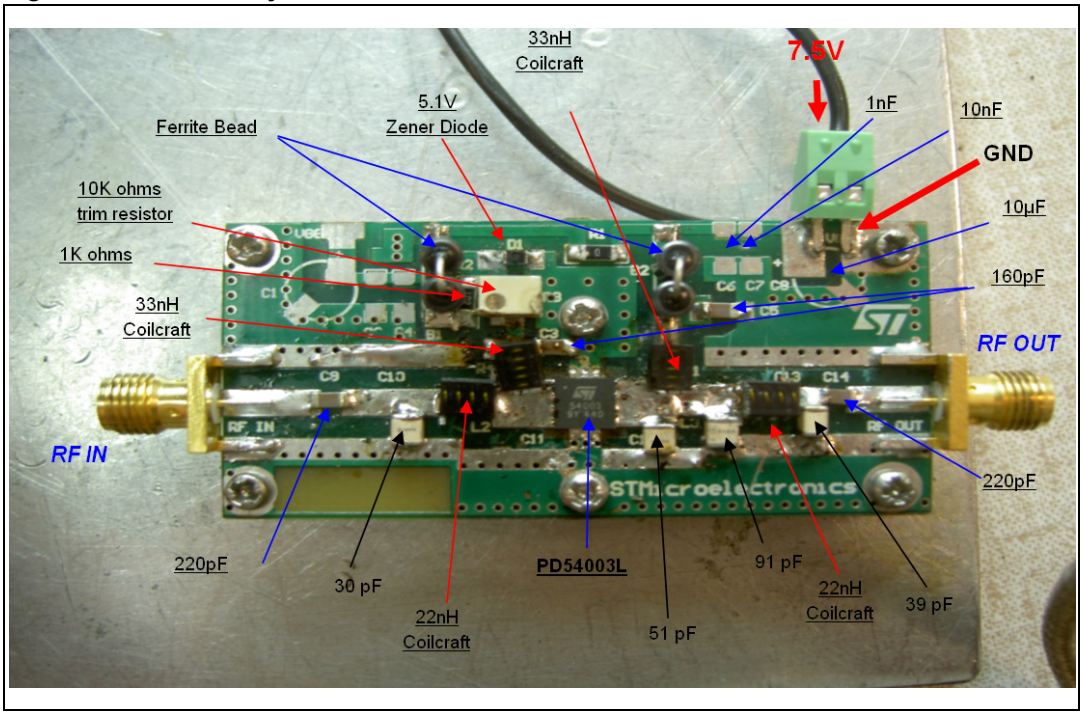


Figure 12. Test fixture component layout

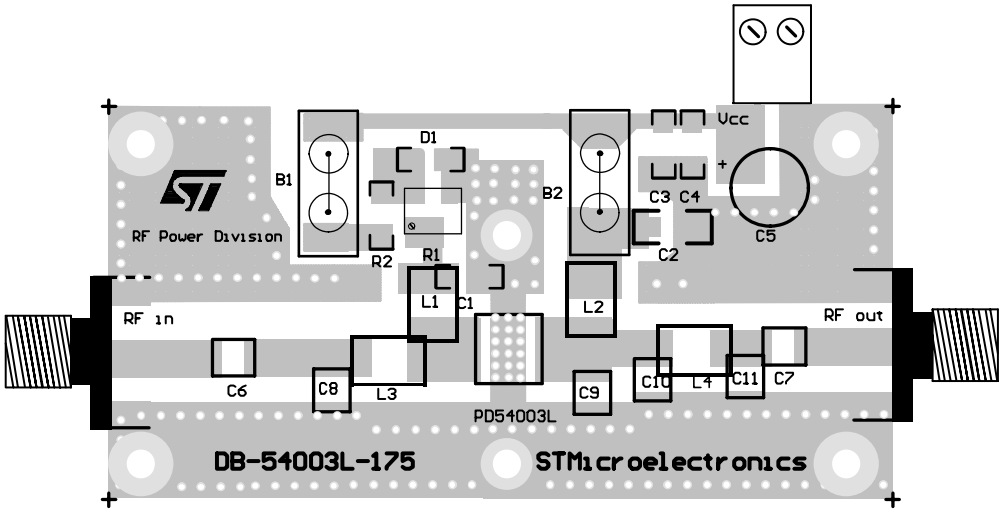
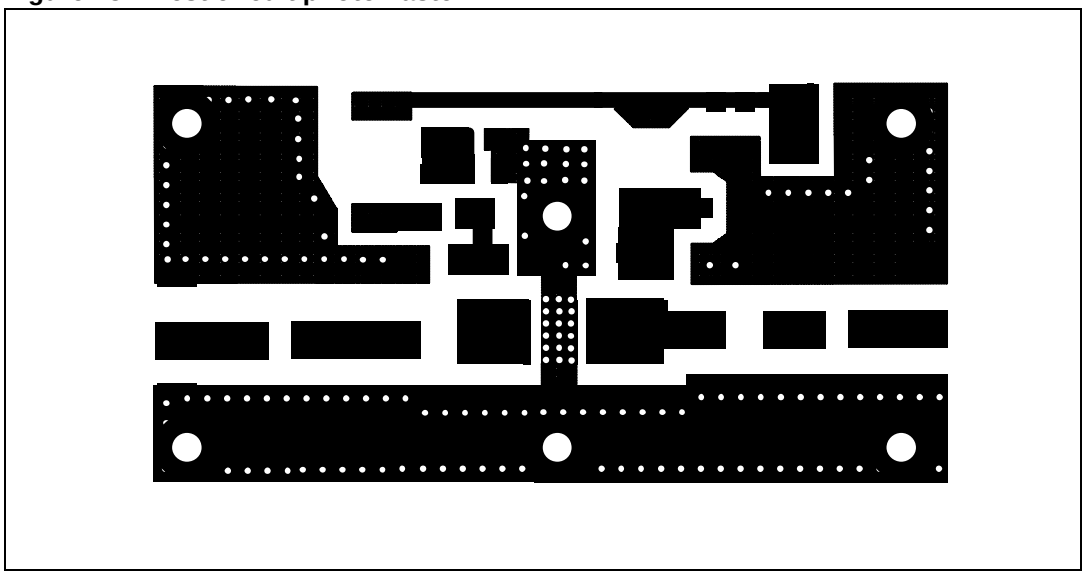
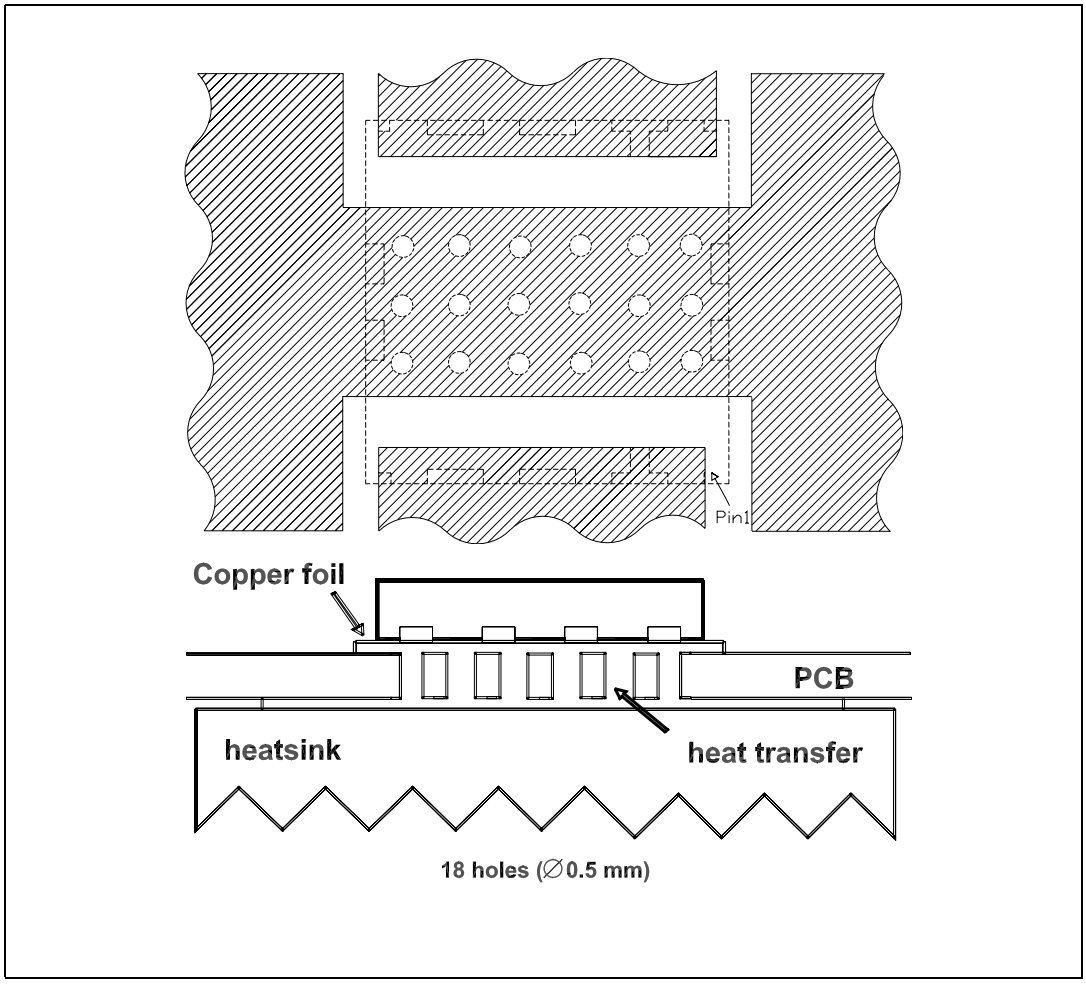


Figure 13. Test circuit photomaster



7 Mounting indications

Figure 14. Standard SMD mounting



8 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 6. 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 15. PowerFLAT™ Package dimensions

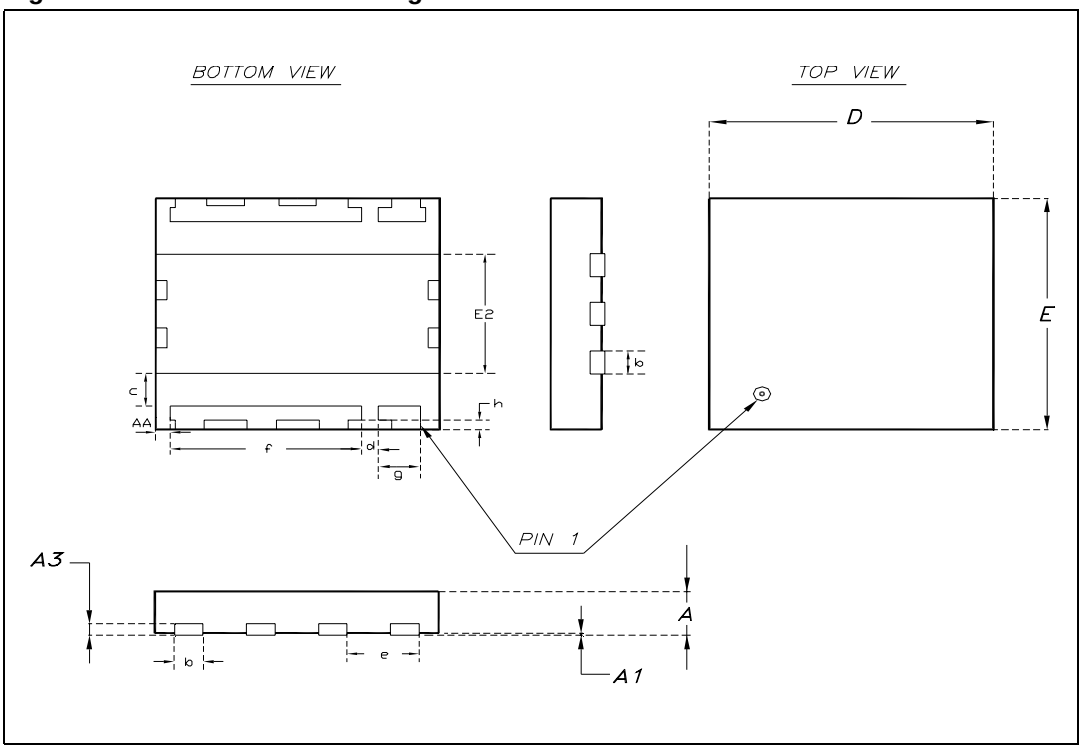
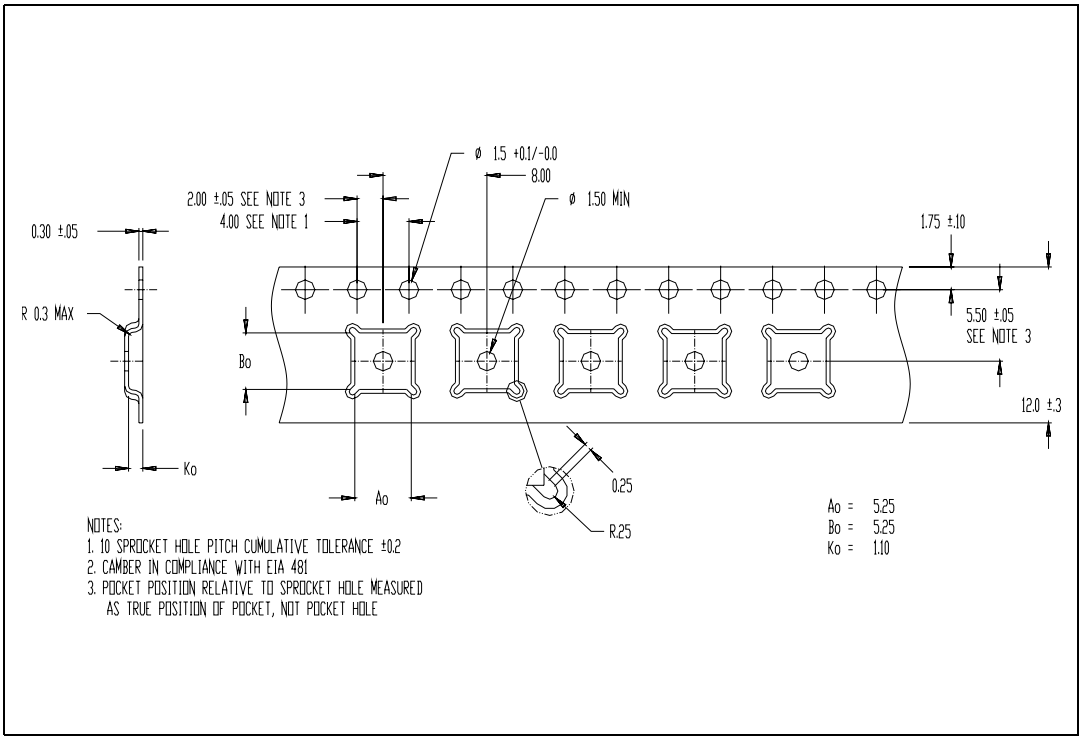


Table 7. PowerFLAT™ Tape & reel dimensions

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 16. PowerFLAT™ Tape & reel



9 Revision history

Table 8. Revision history

Date	Revision	Changes
27-Feb-2006	1	Initial release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST’s terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST’S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZE REPRESENTATIVE OF ST, ST PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS, WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com