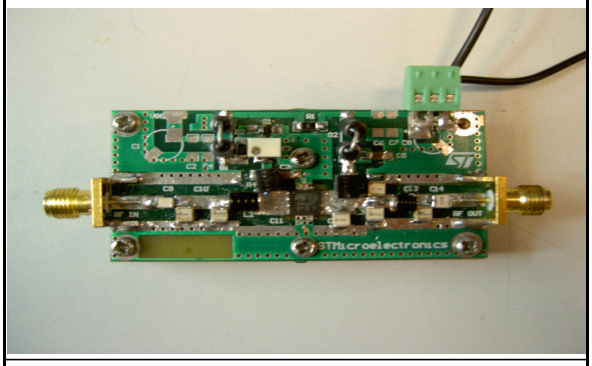
DB-54008L-175

RF POWER Amplifier using 1 x PD54008L N-Channel Enhancement-Mode Lateral MOSFETs

General feature

- Excellent Thermal Stability
- Frequency: 135 - 175 MHz
- Supply Voltage: 7.2V
- Output Power: 8W
- Power Gain: 16.2 ± 1.7dB
- Efficiency: 56% - 57%
- Load Mismatch: 20:1
- Beo Free Amplifier



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

Description

The DB-54008L-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-54008L-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	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 ^{o}C, V_{DD} = 7.5 V, I_{dq} = 50mA

Table 2. Electrical specification

Symbol	Test conditions	Min.	Typ.	Max.	Unit
FREQ	Frequency Range	135		175	MHz
P_{OUT}			8		W
Gain	@ P_{OUT} = 8W		16.2 ± 1.7		dB
ND	@ P_{OUT} = 8W		56 - 57		%
H2	2^{ND} Harmonic @ P_{OUT} = 8W		-22 / -39		dBc
H3	3^{RD} Harmonic @ P_{OUT} = 8W		-40 / -51		dBc
VSWR	Load Mismatch all phases @ P_{OUT} = 8W			20:1	

3 Impedance

Figure 1. Impedance Graphic

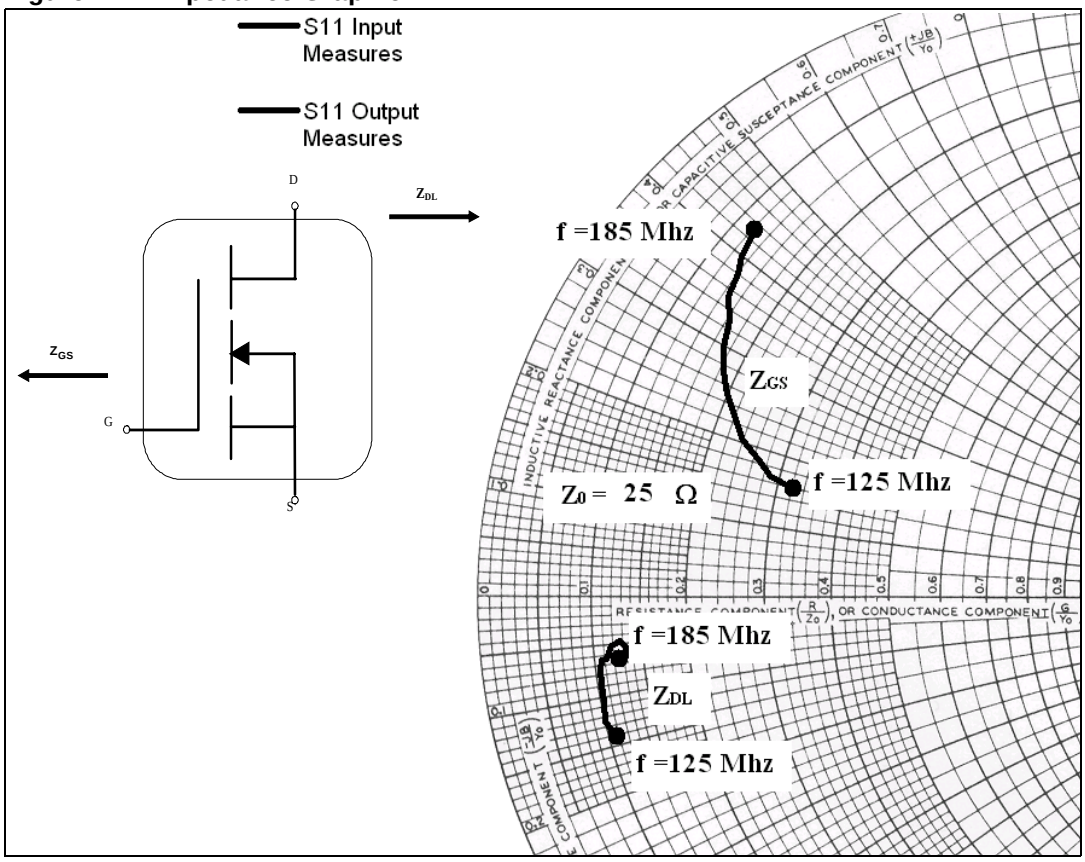


Table 3. Impedance Data

F(MHz)	Z_{GS}	Z_{DL}
130	7.1 + j 4.2	2.4 - j 3.1
135	6.5 + j 4.7	2.5 - j 2.5
140	5.8 + j 5.1	2.5 - j 2.1
145	5.3 + j 5.8	2.5 - j 1.8
150	4.8 + j 6.3	2.5 - j 1.5
155	4.4 + j 6.8	2.7 - j 1.5
160	4.1 + j 7.5	2.8 - j 1.2
165	3.8 + j 8.3	2.9 - j 1.1
170	3.5 + j 8.8	3.0 - j 1.1
175	3.3 + j 9.6	3.2 - j 1.3
180	3.0 + j 10.0	3.2 - j 1.5

4 Typical performance

Figure 2. Output power vs. input power

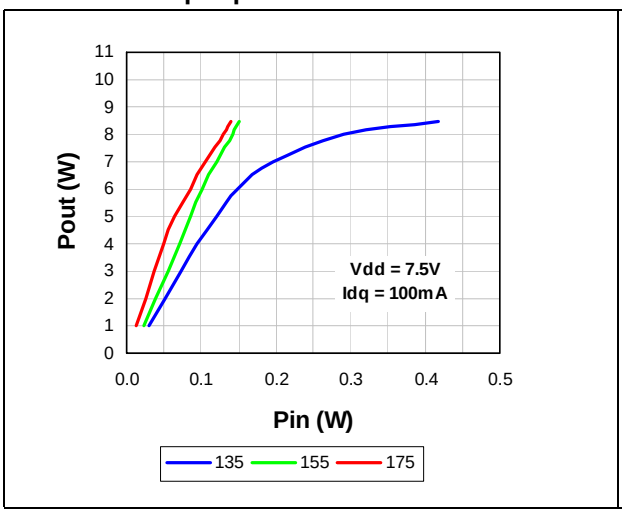


Figure 3. Gain & efficiency vs. output power

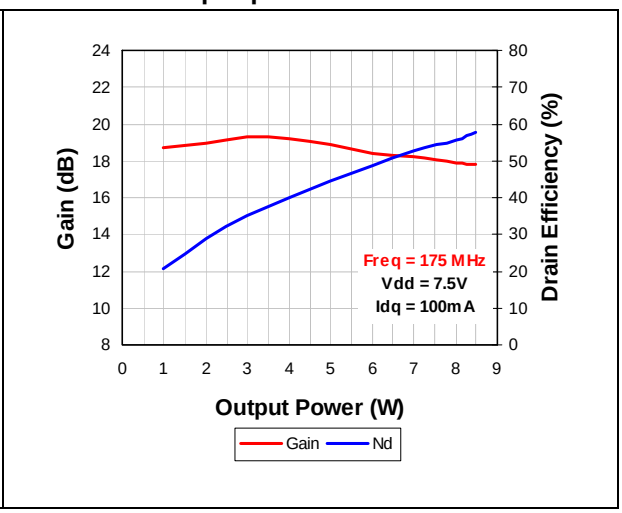


Figure 4. Gain & efficiency vs. output power

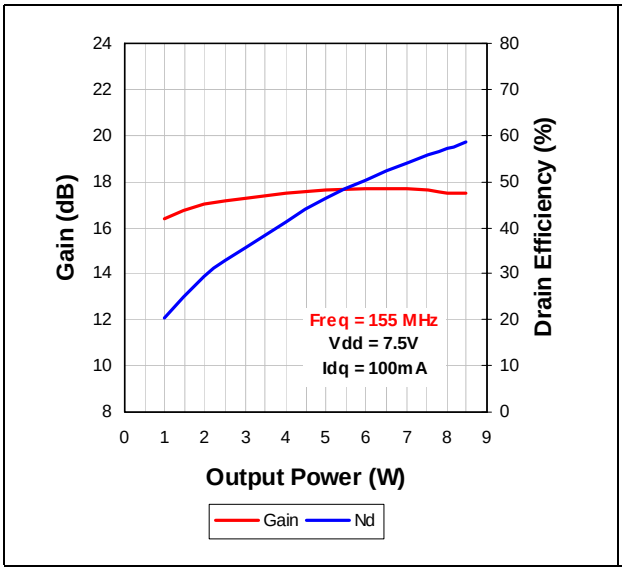


Figure 5. Gain & efficiency vs. output power

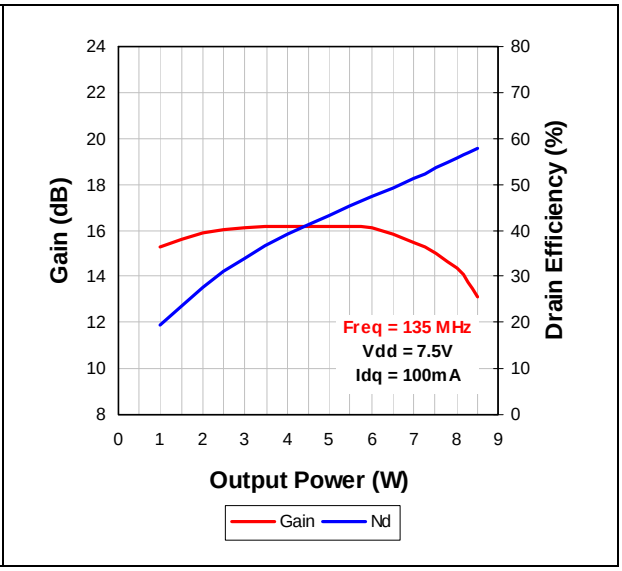


Figure 6. Power gain & efficiency vs. frequency

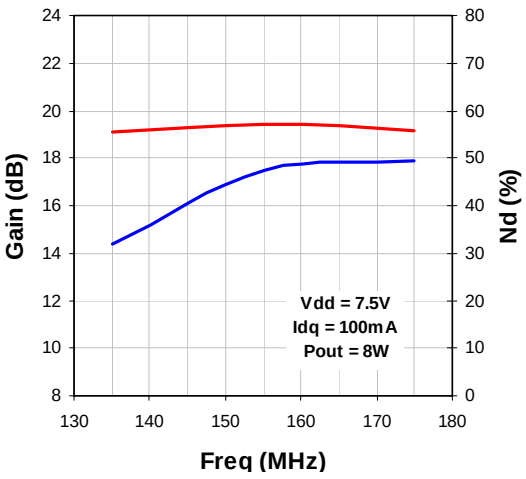


Figure 7. Input return loss vs. frequency

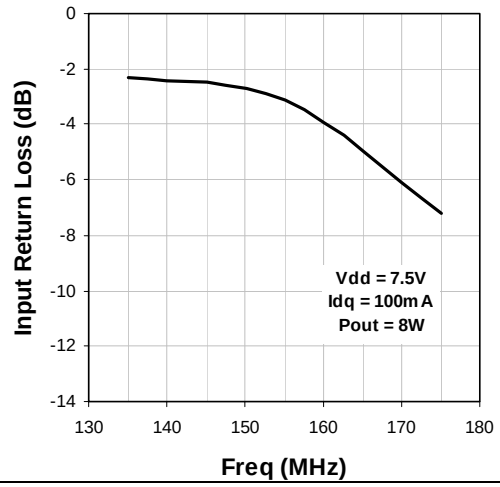


Figure 8. Output power vs. drain voltage

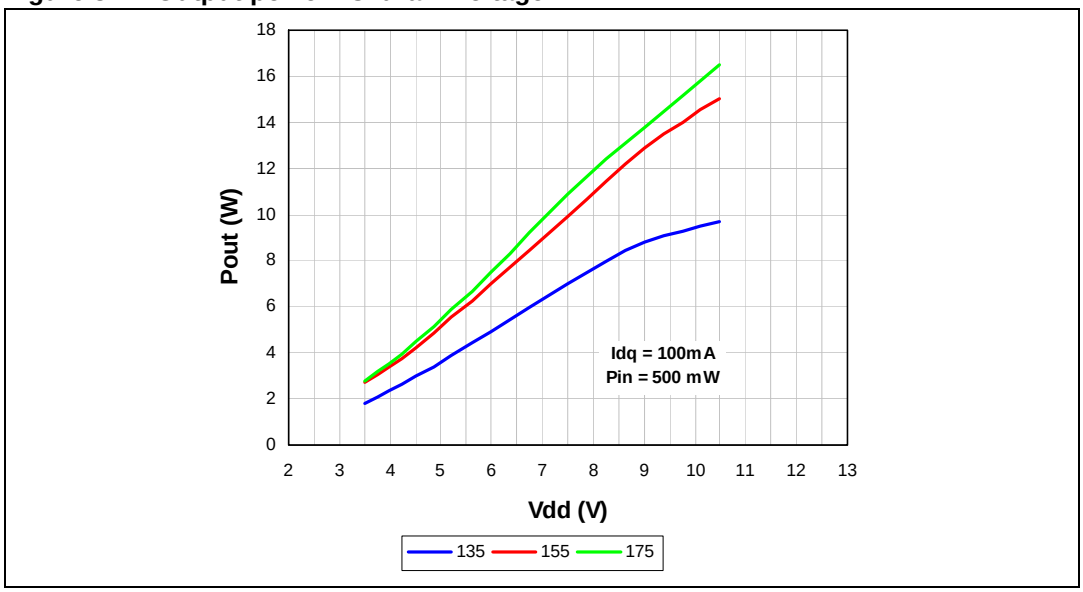
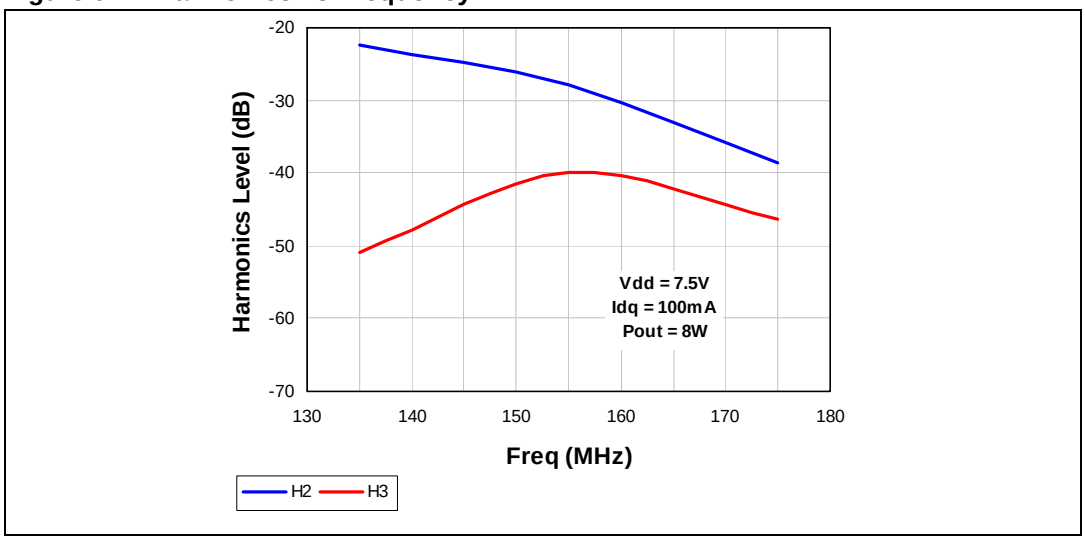


Figure 9. Harmonics vs. frequency



5 Test circuit

Table 4. Test circuit schematic

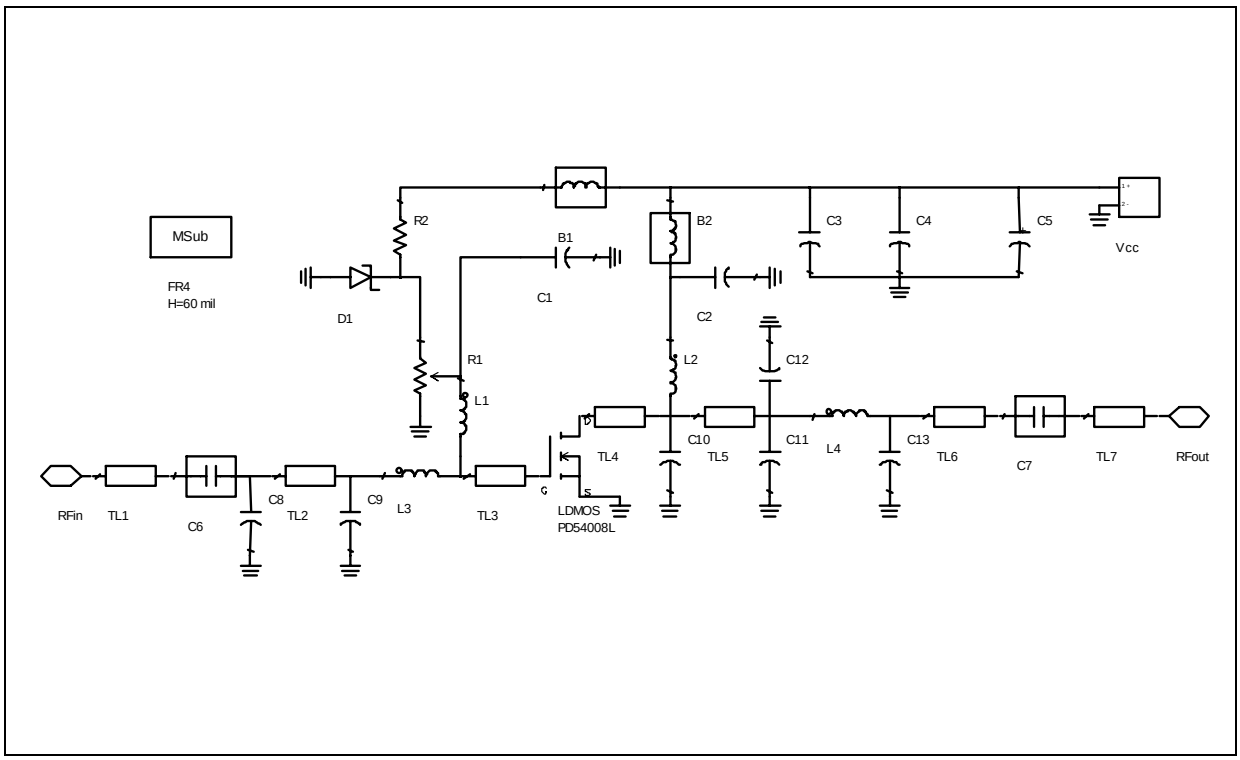


Table 5. Component part list

Part Type	Component ID	Description	Value	Case size	Manufacturer	Part Code
CAP	C4	Capacitor	10nF	1206	Murata	GRM42-6X7R104K50
CAP	C3	Capacitor	1nF	1206	Murata	GRM42-6C0G102J50
CAP	C1	Capacitor	120pF	1206	Murata	GRM42-6C0G121J50
CAP	C2	Capacitor	120pF	1206	Murata	GRM42-6C0G121J50
CAP	C6	Capacitor	330pF	100B	ATC	121
CAP	C7	Capacitor	330pF	100B	ATC	121
CAP	C8	Capacitor	33pF	100B	ATC	2R0
CAP	C9	Capacitor	15pF	100B	ATC	130
CAP	C10	Capacitor	43pF	100B	ATC	200
CAP	C11	Capacitor	120pF	100B	ATC	620
CAP	C12	Capacitor	11pF	100B	ATC	390
CAP	C13	Capacitor	39pF	100B	ATC	4R3

Table 5. Component part list

Part Type	Component ID	Description	Value	Case size	Manufacturer	Part Code
Electrolytic CAP	C5	Capacitor	10uF	SMT	Panasonic	EEVHB1V100P
Ferrite Bead	B2	Ferrite Bead			PANASONIC	EXCELDRC35C
Ferrite Bead	B1	Ferrite Bead			PANASONIC	EXCELDRC35C
INDUCTOR	L1	Inductor	33nH		Coilcraft	
INDUCTOR	L2	Inductor	33nH		Coilcraft	
INDUCTOR	L3	Inductor	22nH		Coilcraft	
TRANSISTOR	PD54008L	LDMOS			STMicroelectronics	PD54008L
POT1	R1	Potentiometer	10K		BOURNS ELECTRONICS	3214W-1-103E
Resistor	R2	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
ZENER2	D1	Zener Diode	5.1V	SOD110	PHILIPS	BZX284C5V1
BOARD	FR-4 THk=0.060" 2OZ Cu Both Sides					

6 Circuit layout

Figure 10. Circuit layout

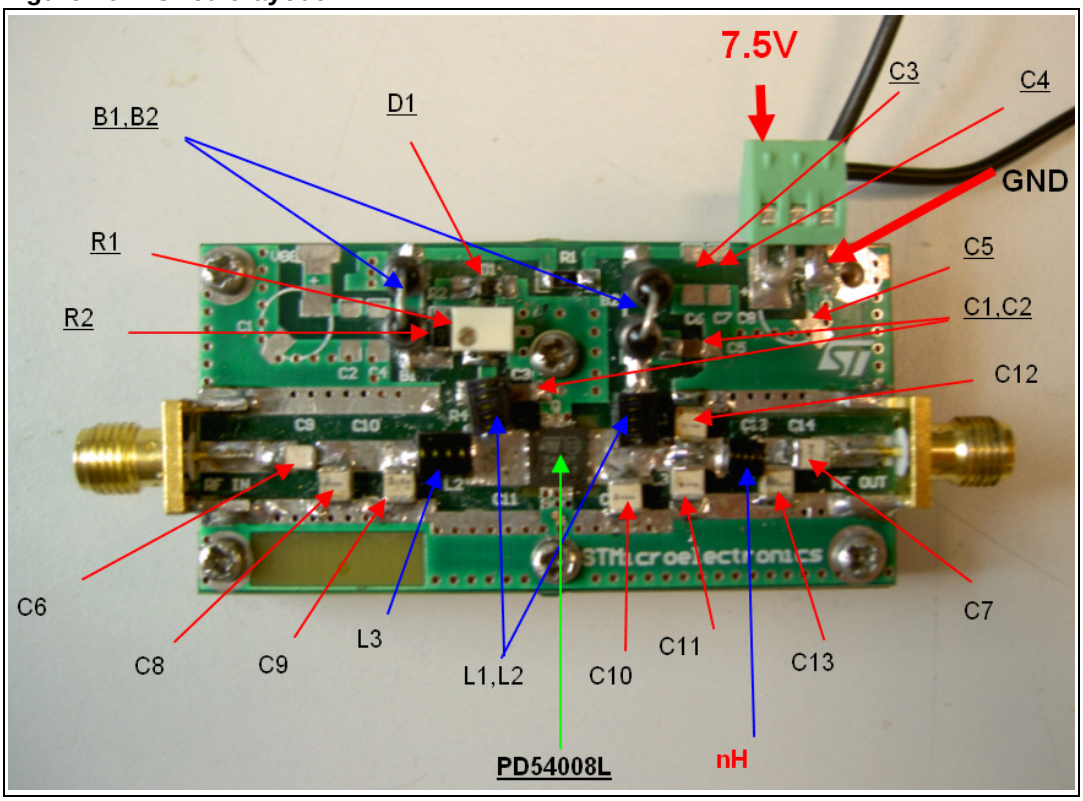


Figure 11. Test fixture component layout

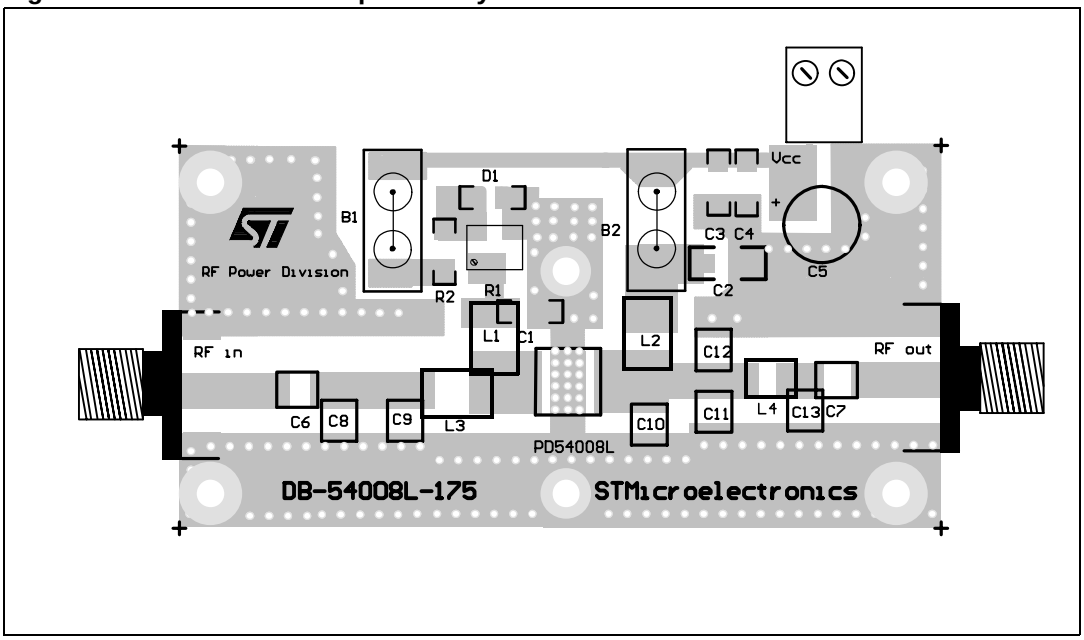
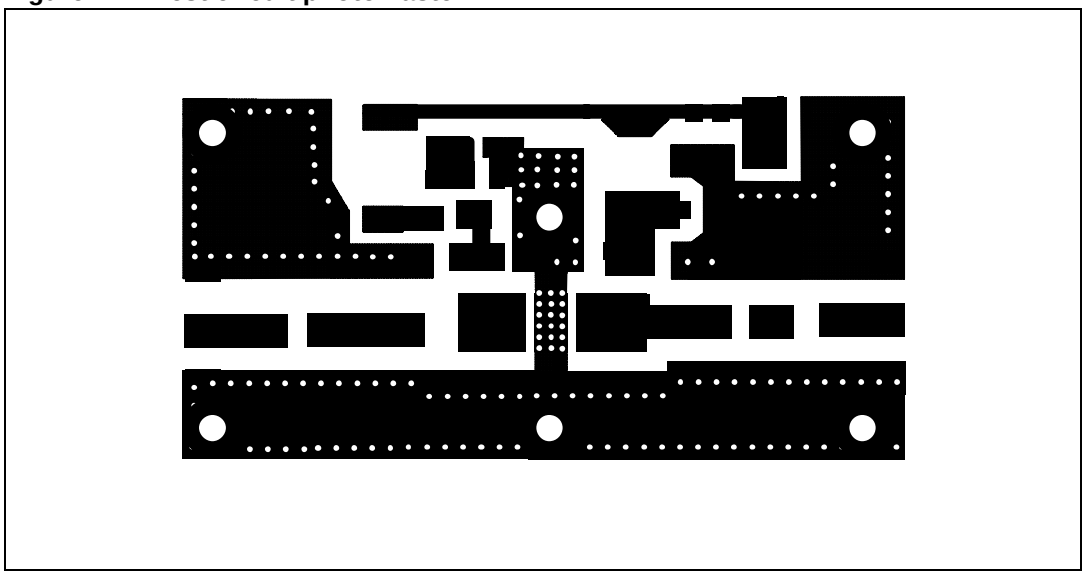
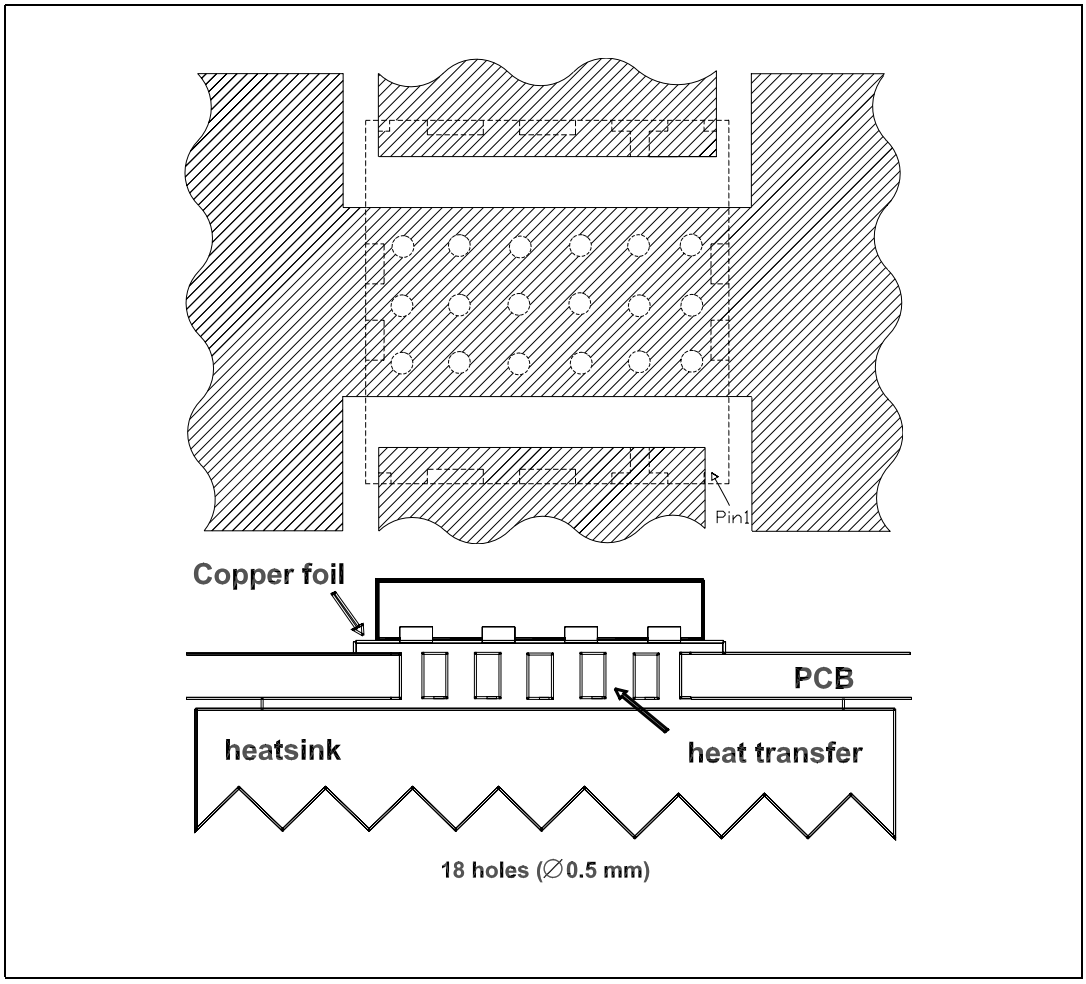


Figure 12. Test circuit photomaster



7 Mounting indications

Figure 13. 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 14. PowerFLAT™ Package dimensions

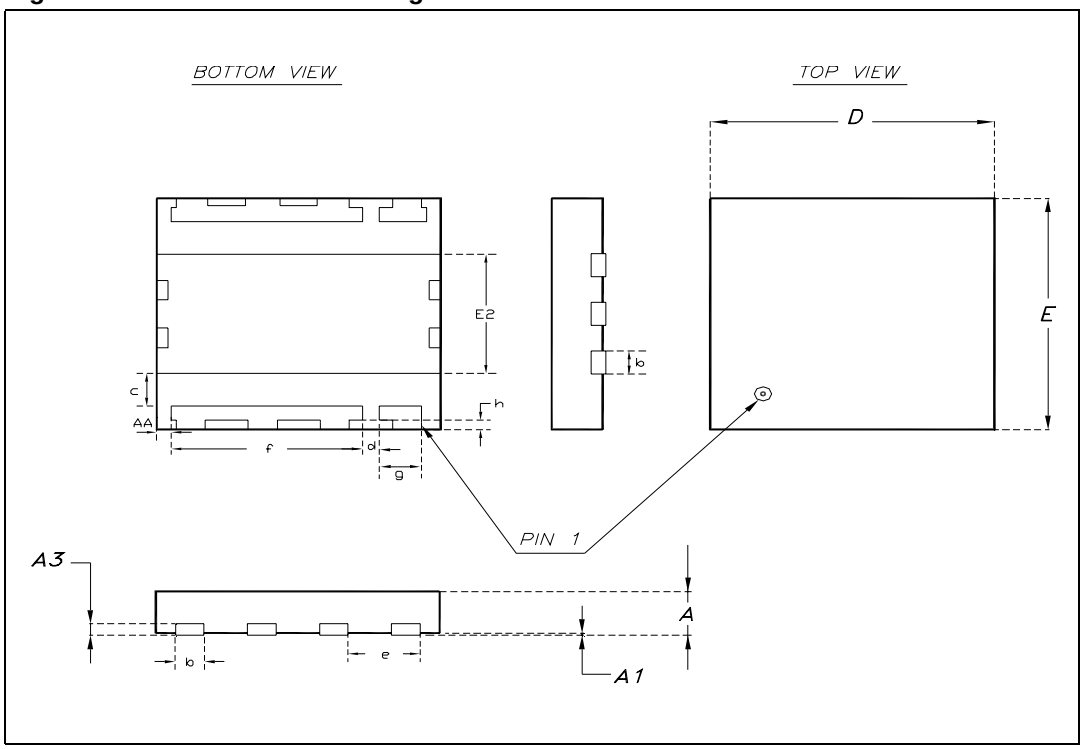
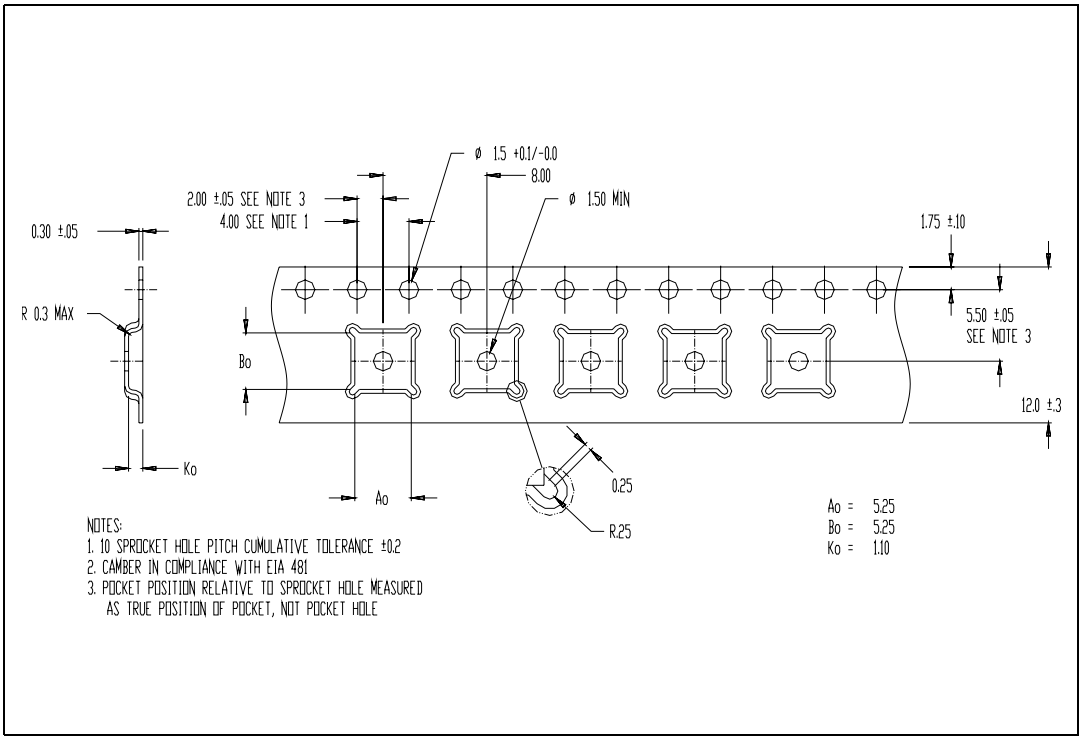


Table 7. PowerFLAT™ Tape & reel dimensions

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 15. PowerFLAT™ Tape & reel



9 Revision history

Table 8. Revision history

Date	Revision	Changes
09-Mar-2006	1	Initial release.

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