



DB-54003L-235

RF power amplifier using 1 x PD54003L
N-channel enhancement-mode lateral MOSFETs

Preliminary Data

Features

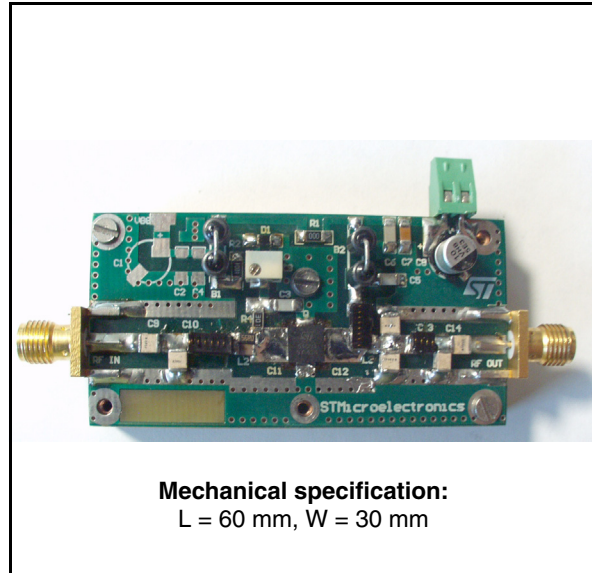
- Excellent thermal stability
- Frequency: 215 - 235MHz
- Supply voltage: 7.2V
- Output power: 5W
- Power gain: $13 \pm 0.5\text{dB}$
- Efficiency: 63% - 65%
- Load mismatch: 20:1
- BeO free amplifier

Description

The DB-54003L-235 is a common source N-Channel Enhancement-Mode Lateral Field Effect RF power amplifier designed for VHF SEISMIC applications.

Order code

- DB-54003L-235



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1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	7.2	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

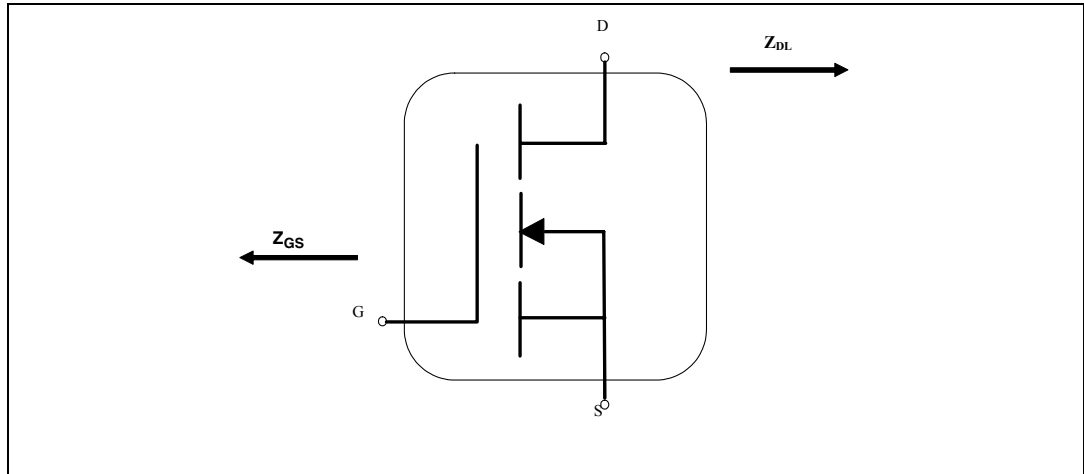
$T_A = +25\text{ °C}$, $V_{DD} = 7.2\text{V}$, $I_{dq} = 100\text{ mA}$, unless otherwise specified

Table 2. RF data

Symbol	Parameters	Test conditions	Min	Typ	Max	Unit
f	Frequency range		215		235	MHz
P_{out}	Output power		4	5		W
G_p	Power gain	$P_{OUT} = 5\text{W}$		13 +/- 0.5		dB
N_D	Efficiency	$P_{OUT} = 5\text{W}$		63 - 65		%
H2	2nd harmonic	$P_{OUT} = 5\text{W}$		-20		dBc
H3	3rd harmonic	$P_{OUT} = 5\text{W}$			-30	dBc
VSWR	Load mismatch	$P_{OUT} = 5\text{W}$, all phases		20:1		

3 Impedance

Figure 1. Impedance graphic



Note: Optimum board impedances for which the DUT operates, at given DC bias and frequency band, to meet application requirements.

Table 3. Impedance data

f(MHz)	$Z_{GS} (\Omega)$	$Z_{DL} (\Omega)$
215	$9.9 + j3.8$	$4.9 - j2.3$
220	$9.6 + j5.2$	$5.0 - j1.9$
225	$9.3 + j6.5$	$5.0 - j1.5$
230	$9.1 + j7.9$	$5.0 - j1.2$
235	$8.9 + j9.4$	$5.2 - j0.9$

4 Typical performance

$V_{DD} = 7.20V, I_{DQ} = 100mA$

Figure 2. Output power vs input power

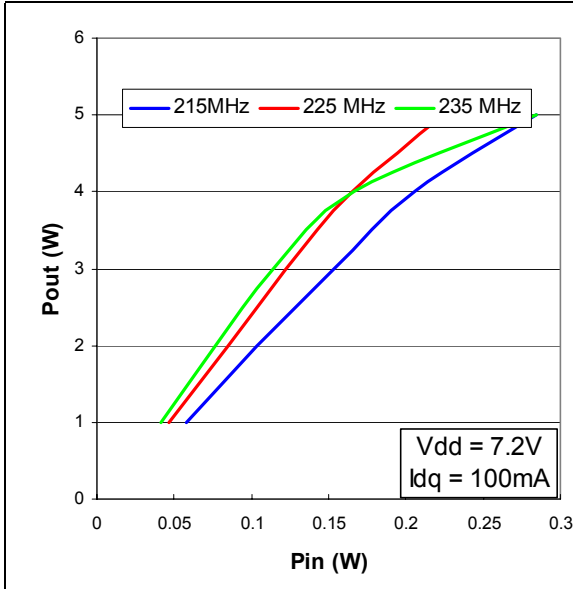


Figure 3. Efficiency vs output power

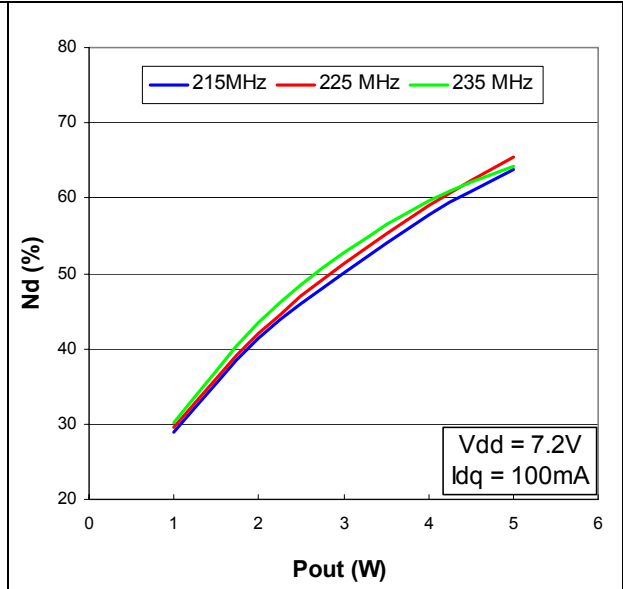


Figure 4. Gain vs output power

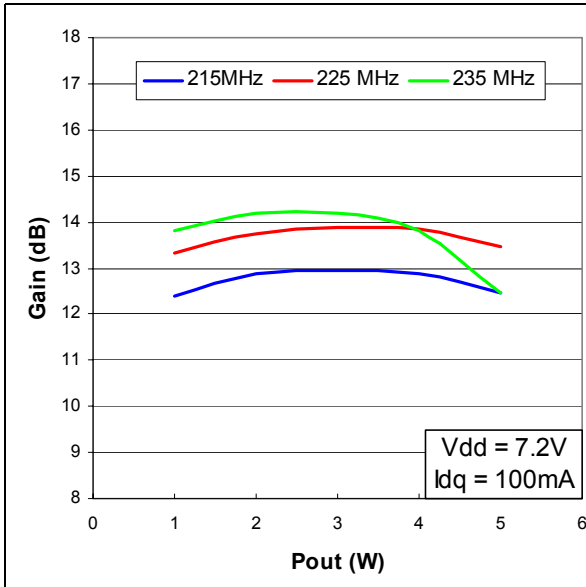


Figure 5. Pout & efficiency vs frequency

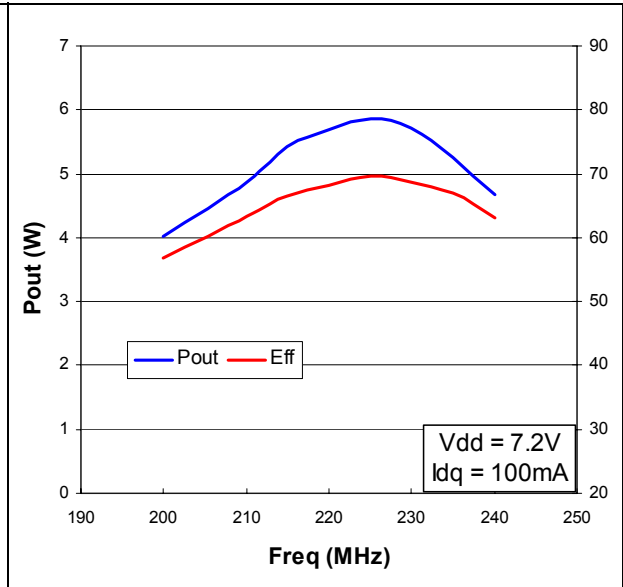


Figure 6. Harmonics vs frequency

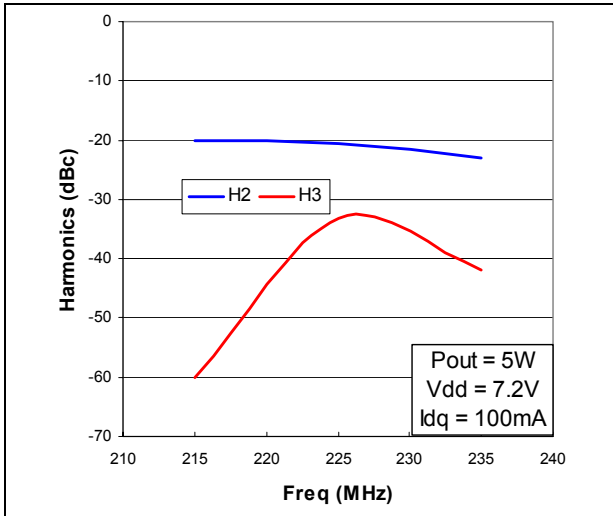


Figure 7. Output power vs input power

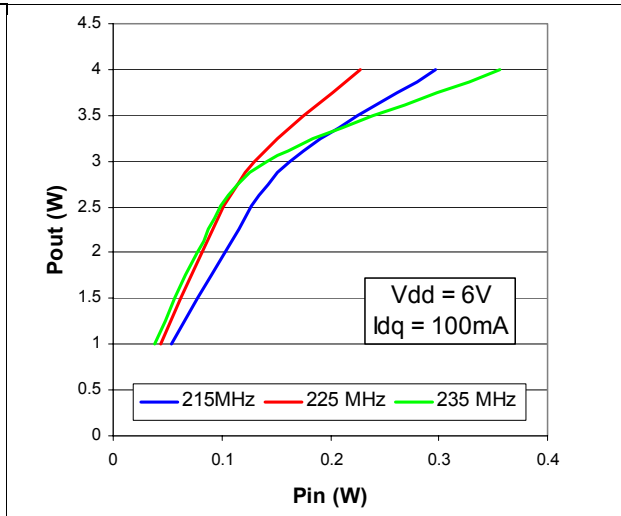


Figure 8. Efficiency vs output power

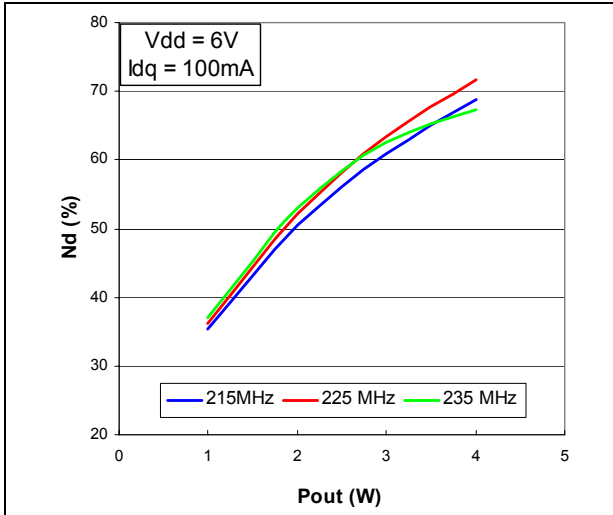


Figure 9. Output power vs input power

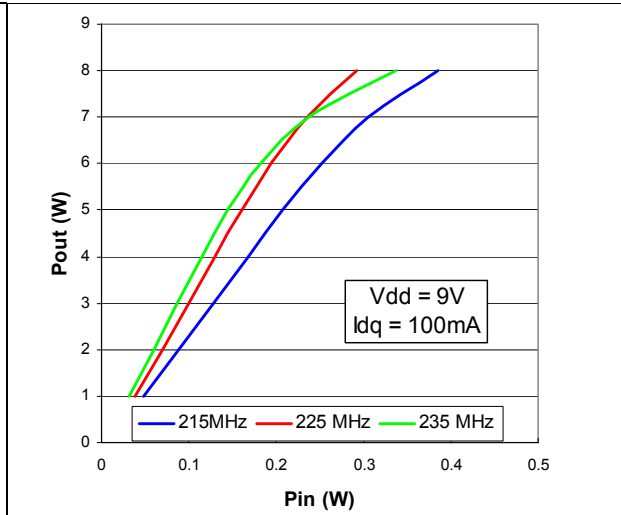
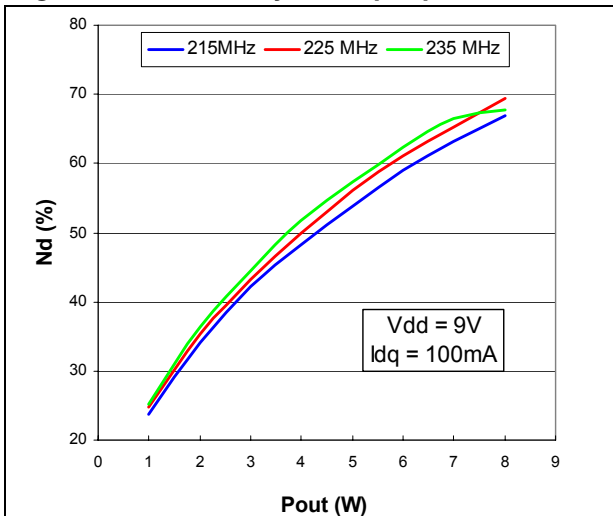


Figure 10. Efficiency vs output power



5 Test circuit

Table 4. Test circuit schematic

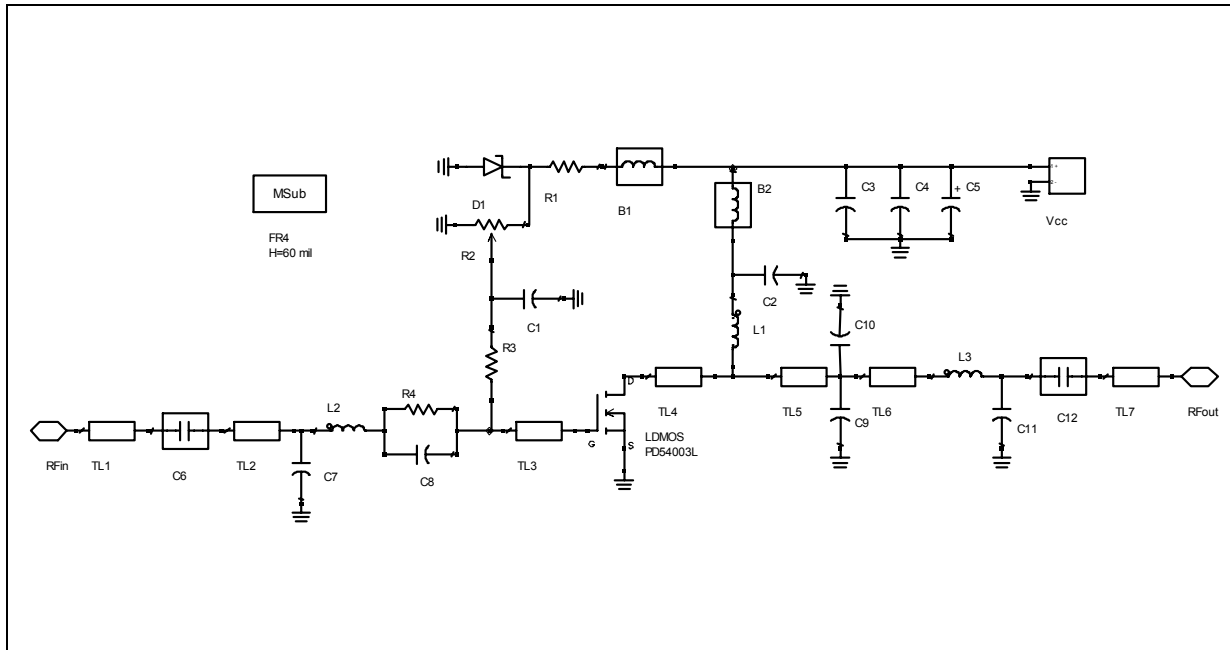
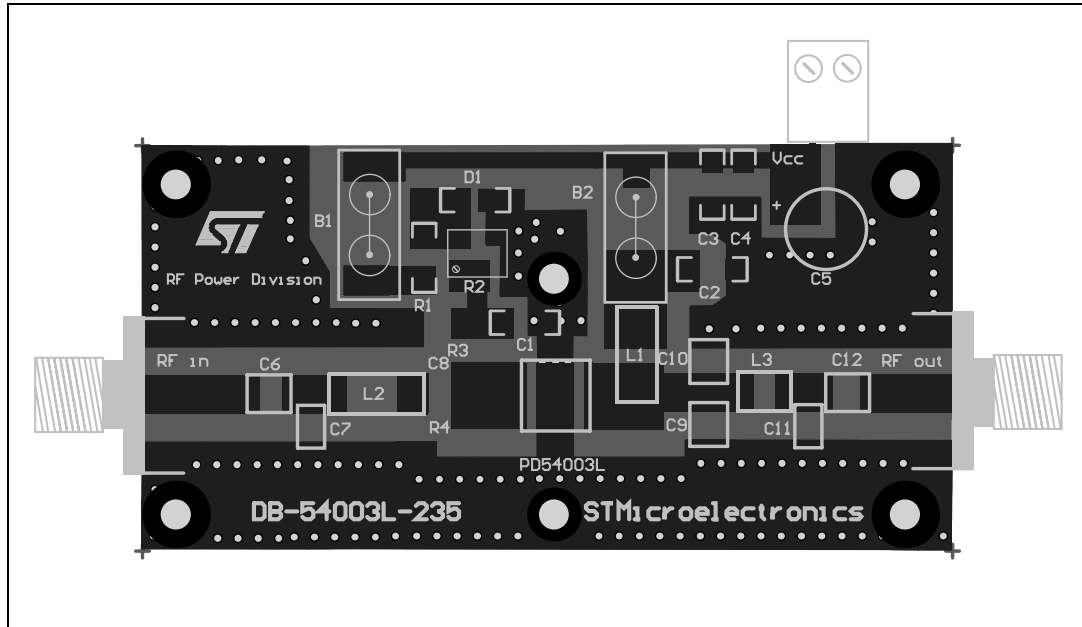


Table 5. Components part list for DB-54003L-235

Component ID	Description	Value	Case size	Manufacturer	Part Code
B1	Ferrite Bead			PANASONIC	EXCELDR35C
B2	Ferrite Bead			PANASONIC	EXCELDR35C
C1, C2	Capacitor	120 pF	1206	MURATA	GRM42-6 COG 151J 50_
C3	Capacitor	1 nF	1206	MURATA	GRM42-6 COG 102J 50
C4	Capacitor	100 nF	1206	MURATA	GRM42-6_X7R 104K 50_
C5	Capacitor	10 uF	SMT	PANASONIC	EEVHB1V100P
C6, C12	Capacitor	220 pF	100B	ATC	ATC 100B 221JW
C7	Capacitor	39 pF	100B	ATC	ATC 100B 390 JW
C8	Capacitor	47 pF	100B	MURATA	GRM42-6 COG
C9, C10	Capacitor	33 pF	100B	ATC	ATC 100B 330JW
C11	Capacitor	24 pF	100B	ATC	ATC 100B 240 JW
D1	Zener Diode	5.1 V	SOD110	PHILIPS	BZX284C5V1
L1	Inductor	28 nH		COILCRAFT	B08T
L2	Inductor	12,5 nH		COILCRAFT	A04T
L3	Inductor	22 nH		COILCRAFT	B07T
R1	Resistor	1 K Ω	1206	TYCO ELECTRONICS	01623440-1
R2	Potentiometer	10 K Ω		BOURNS ELECTRONICS	3214W-1-103E
R3	Resistor	300 Ω	1206	BOURNS ELECTRONICS	
R4	Resistor	56 Ω	1206	BOURNS ELECTRONICS	
TL1	Transmission Line	W=2.87 mm	L=7.4 mm		
TL2	Transmission Line	W=2,87 mm	L=1,0 mm		
TL3	Transmission Line	W=4.98 mm	L=3,8 mm		
TL4	Transmission Line	W=4.98 mm	L=5.0 mm		
TL5	Transmission Line	W=2,87 mm	L=2,0 mm		
TL6	Transmission Line	W=2.87 mm	L=1,6 mm		
TL7	Transmission Line	W=2.87 mm	L=6,1 mm		
PD54003L	LDMOS			STMicroelectronics	PD54003L
Board	FR-4 THk=0.060" 2OZ Cu Both Sides				

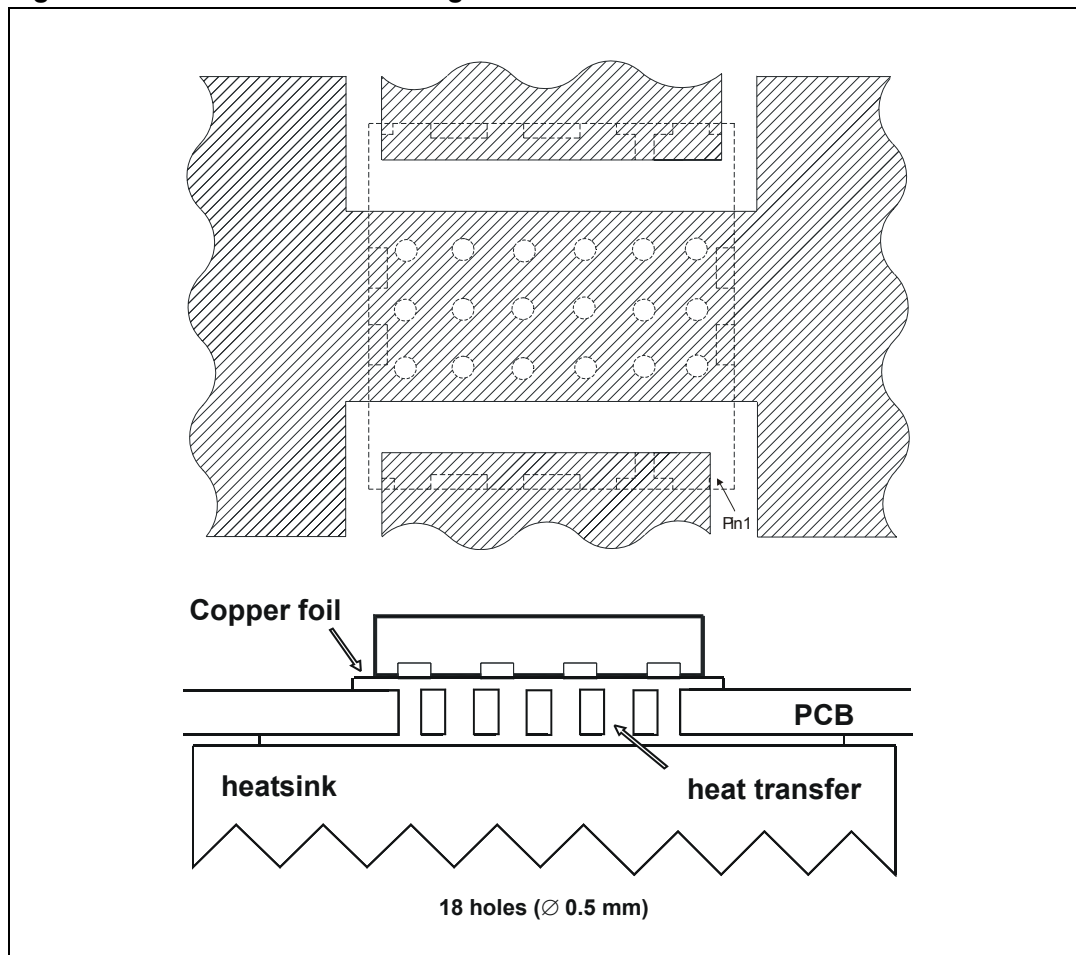
6 Circuit layout

Figure 11. Test fixture component layout



7 Mounting indications

Figure 12. Standard SMD mounting



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 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 13. PowerFLAT™ package dimensions

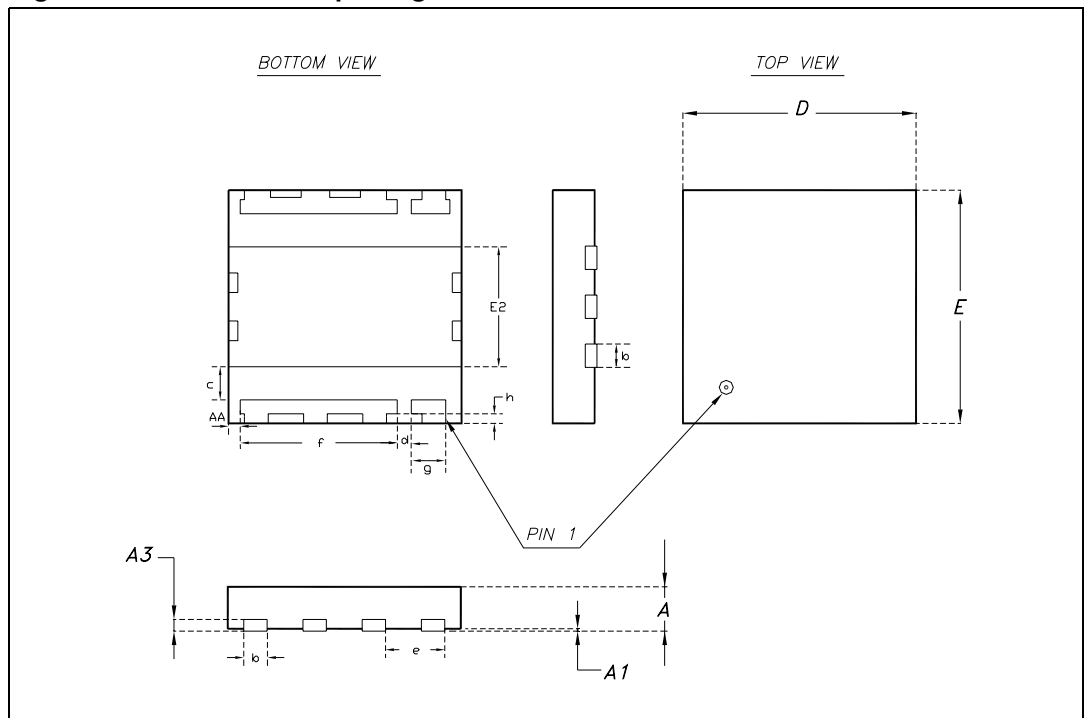
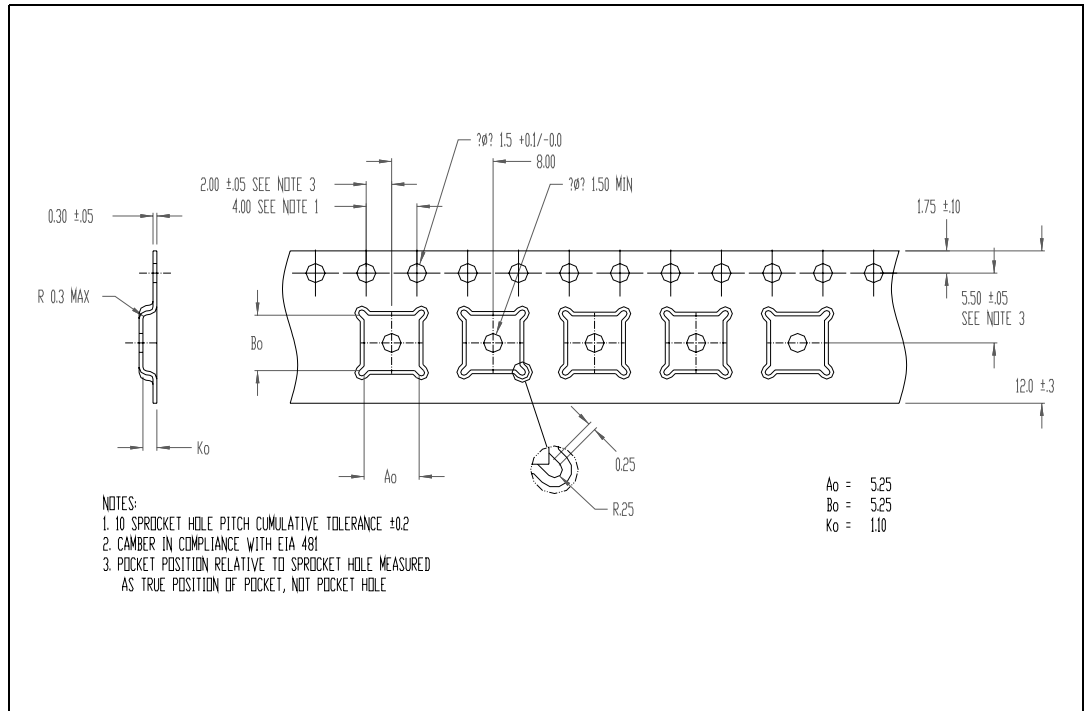


Table 7. PowerFLAT™ tape and reel dimensions

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 14. PowerFLAT™ tape and reel



9 Revision history

Table 8. Revision history

Date	Revision	Changes
10-Jul-2007	1	First release

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