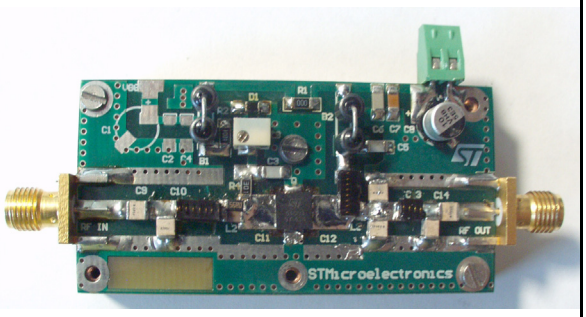
DB-54003L-235

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 ± 0.5dB
- Efficiency: 63% - 65%
- Load mismatch: 20:1
- BeO free amplifier



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

Description

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

Order code

- DB-54003L-235

Contents

1 Electrical data 3
1.1 Maximum ratings 3
2 Electrical characteristics 3
3 Impedance 4
4 Typical performance 5
5 Test circuit 7
6 Circuit layout 9
7 Mounting indications 10
8 Package mechanical data 11
9 Revision history 14

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

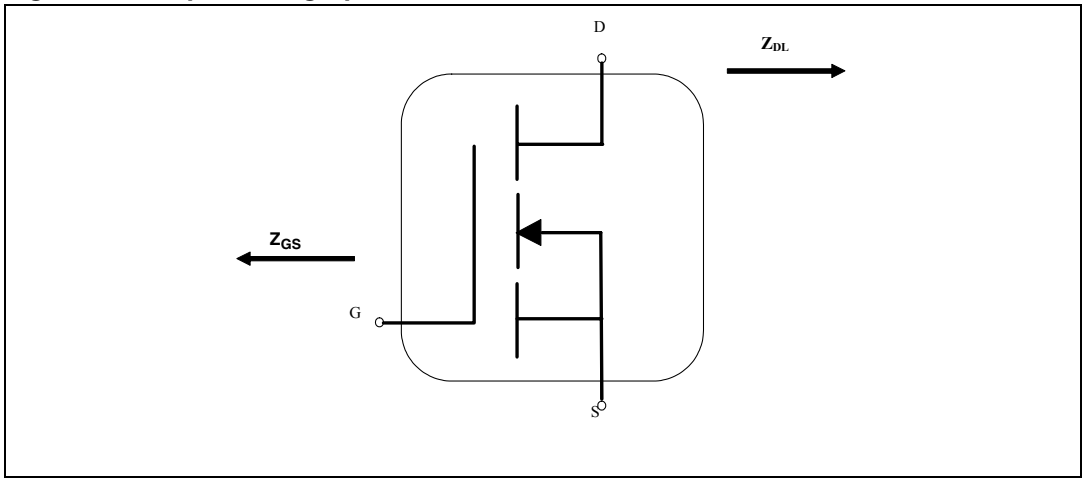
T_A = +25 °C, V_{DD} = 7.2V, I_{dq} = 100 mA, unless otherwise specified

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} = 5W		13 +/- 0.5		dB
N_D	Efficiency	P_{OUT} = 5W		63 - 65		%
H2	2nd harmonic	P_{OUT} = 5W		-20		dBc
H3	3rd harmonic	P_{OUT} = 5W			-30	dBc
VSWR	Load mismatch	P_{OUT} = 5W, 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} (Ω)	Z_{DL} (Ω)
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 + 9,4	5,2 - j0,9

4 Typical performance

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

Figure 2. Output power vs input power

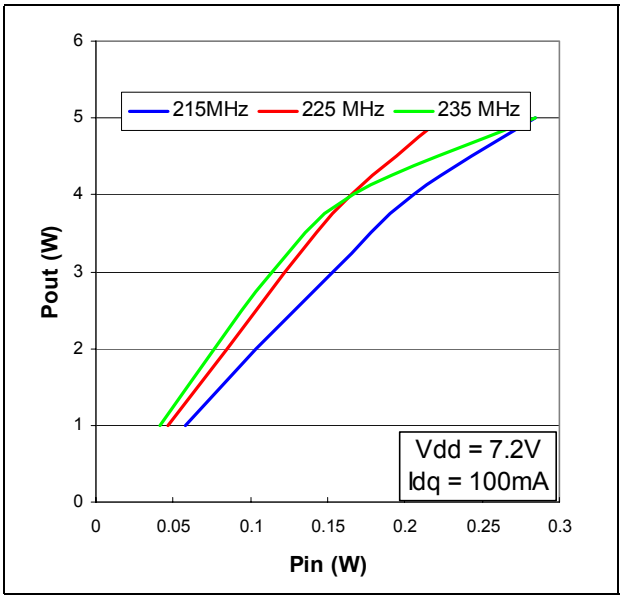


Figure 3. Efficiency vs output power

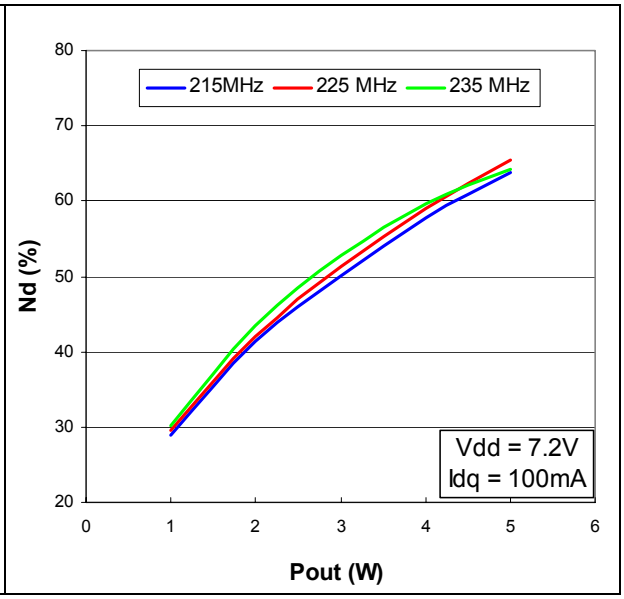


Figure 4. Gain vs output power

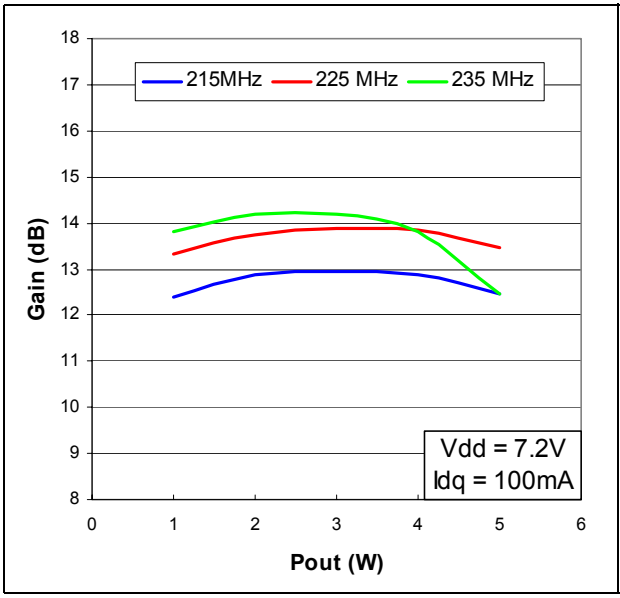


Figure 5. Pout & efficiency vs frequency

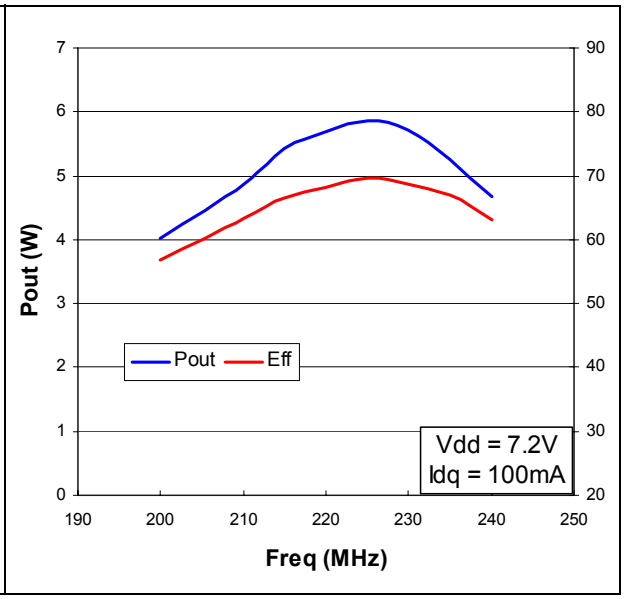


Figure 6. Harmonics vs frequency

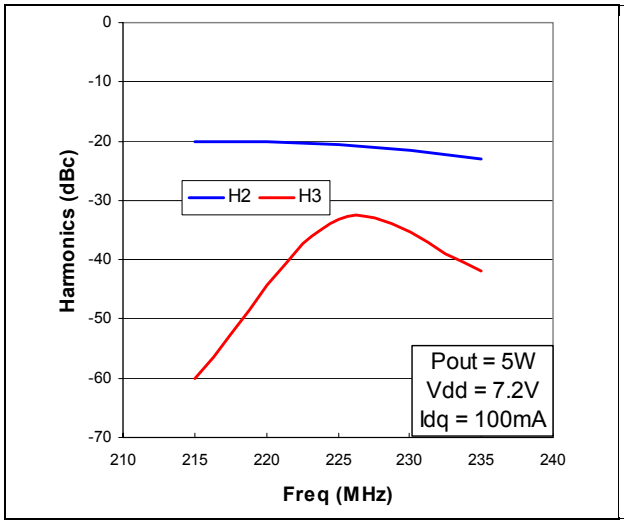


Figure 7. Output power vs input power

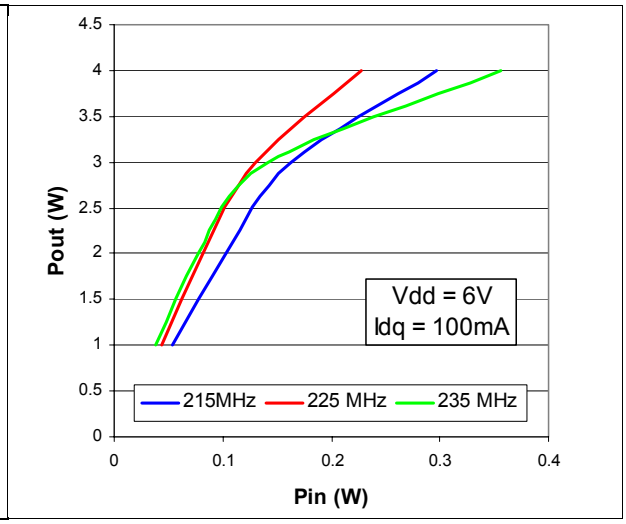


Figure 8. Efficiency vs output power

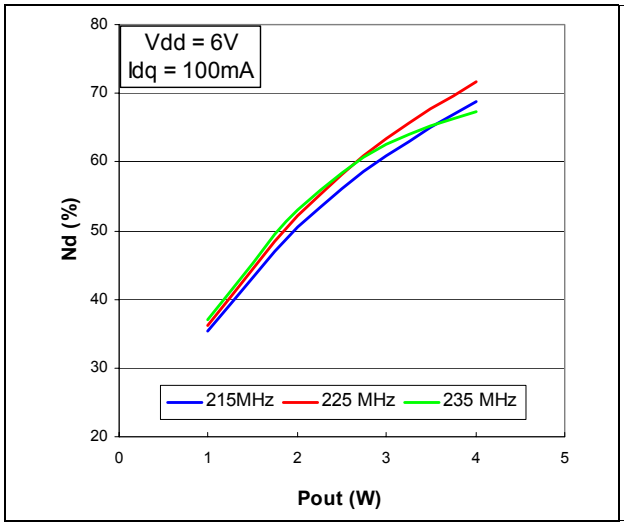


Figure 9. Output power vs input power

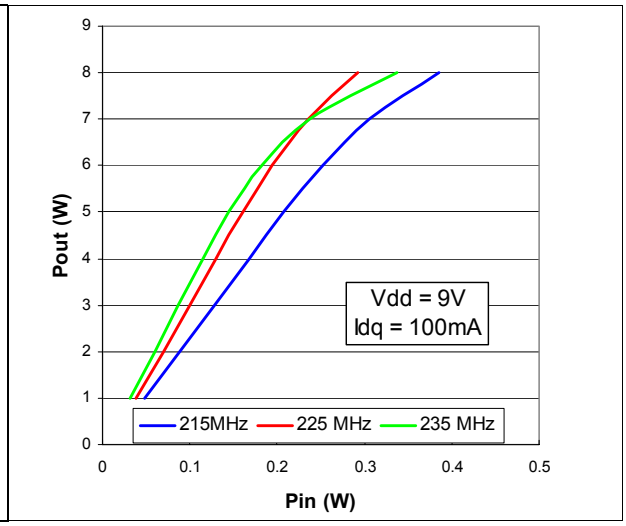
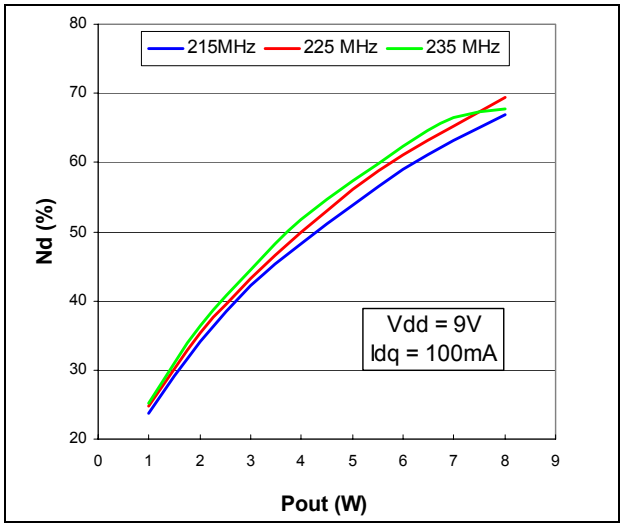


Figure 10. Efficiency vs output power



5 Test circuit

Table 4. Test circuit schematic

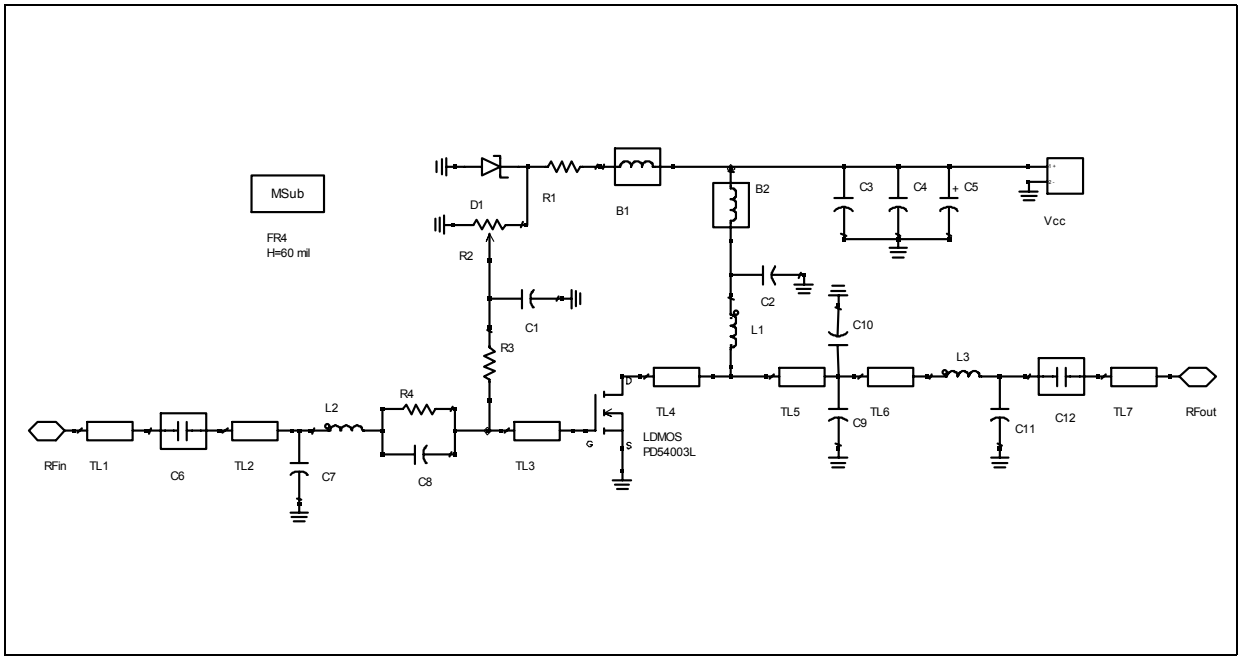
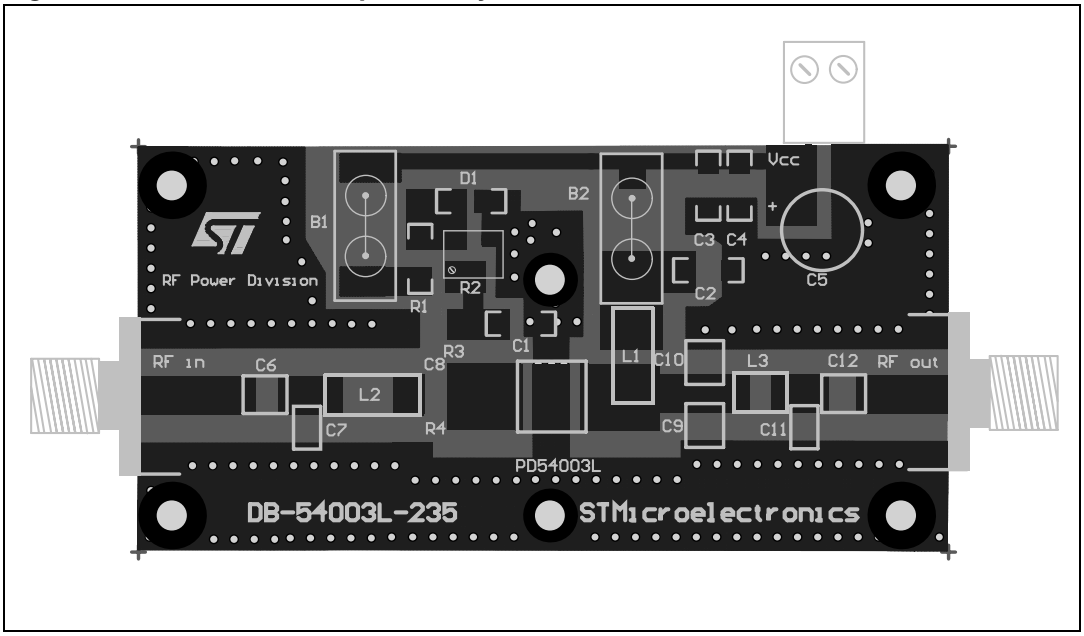


Table 5. Components part list for DB-54003L-235

Component ID	Description	Value	Case size	Manufacturer	Part Code
B1	Ferrite Bead			PANASONIC	EXCELDRC35C
B2	Ferrite Bead			PANASONIC	EXCELDRC35C
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 KΩ	1206	TYCO ELECTRONICS	01623440-1
R2	Potentiometer	10 KΩ		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				

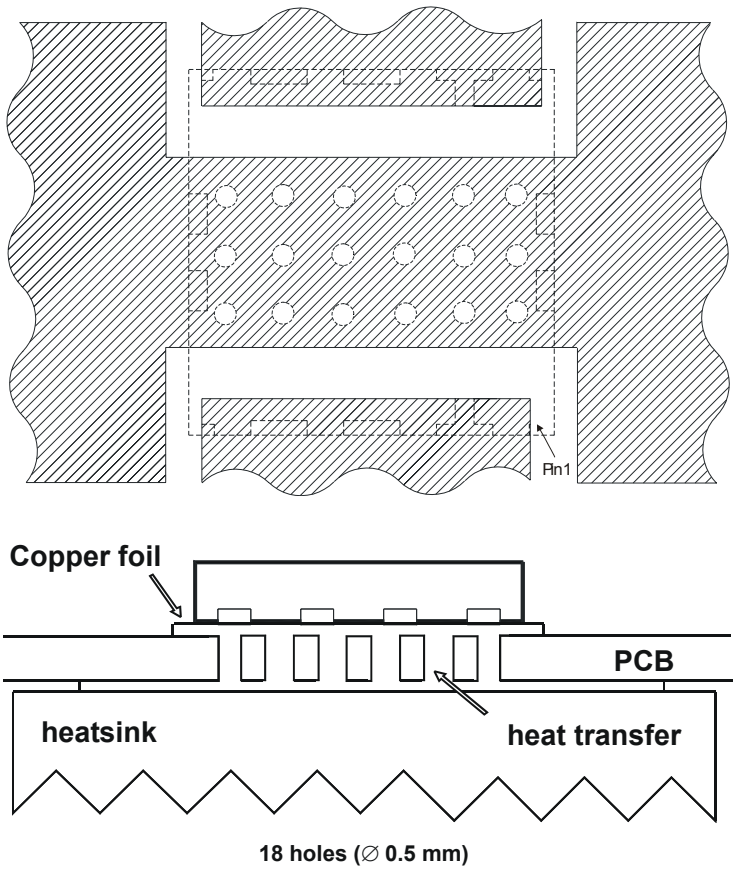
6 Circuit layout

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

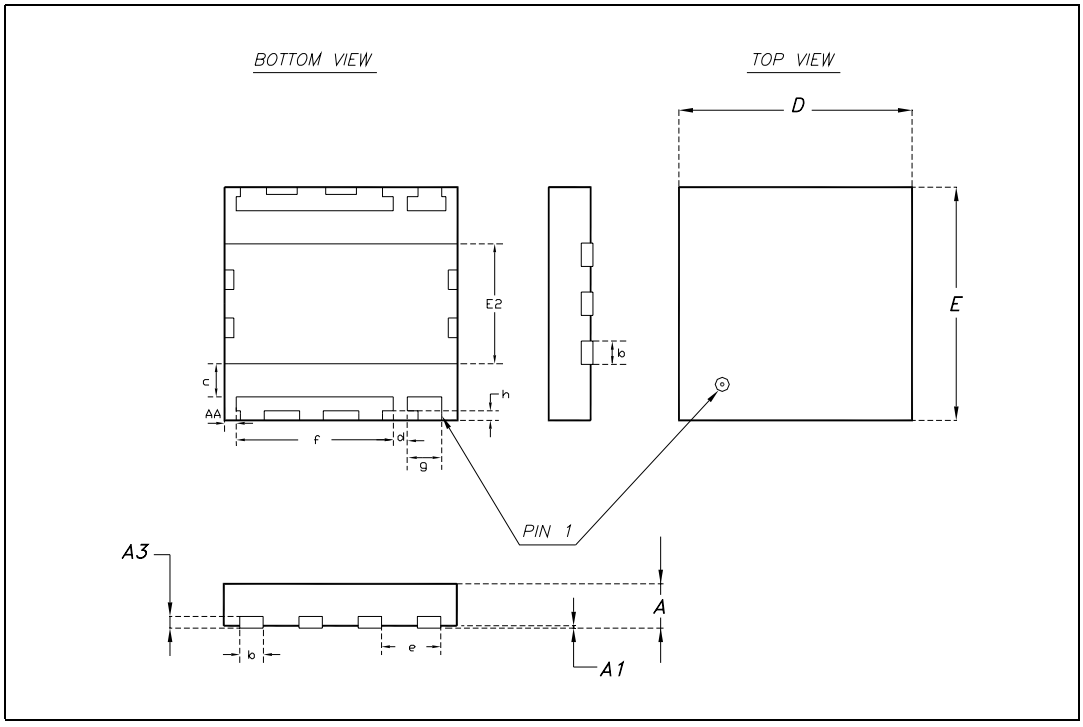
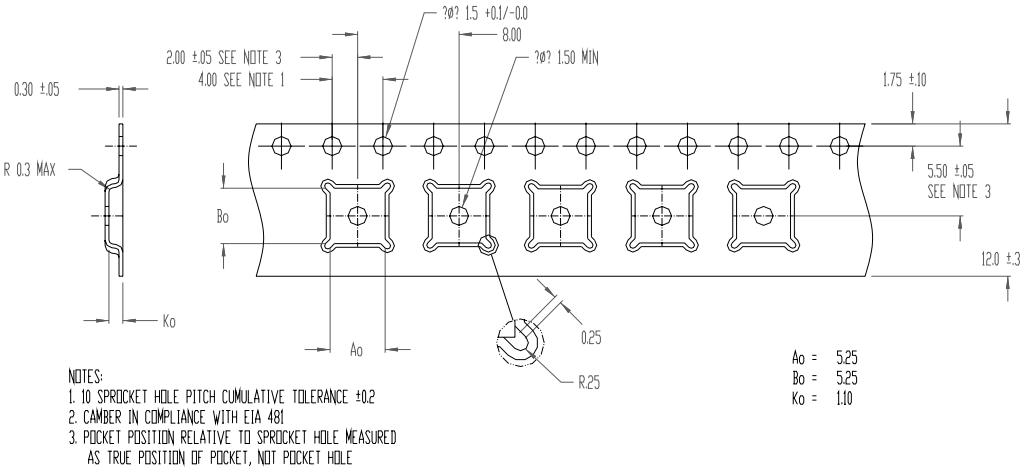


Table 7. PowerFLAT™ tape and reel dimensions

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

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 AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, 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. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER’S OWN RISK.

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