

Evaluation board using 1x PD55003L-E for 2-way UHF radio

Features

- Excellent thermal stability
- Frequency: 410 - 512 MHz
- Supply voltage: 12.5 V
- Output power: > 3 W
- Power gain: 15.8 +/-1.2 dB
- Efficiency: 50 % - 57 %
- Load mismatch: 20:1
- BeO free amplifier

Description

The DB-55003L-512 is an evaluation board using PD55003L-E LDMOS transistor and designed for 2-way UHF mobile radio.

For additional informations on PD55003L-E, please refer to its datasheet.

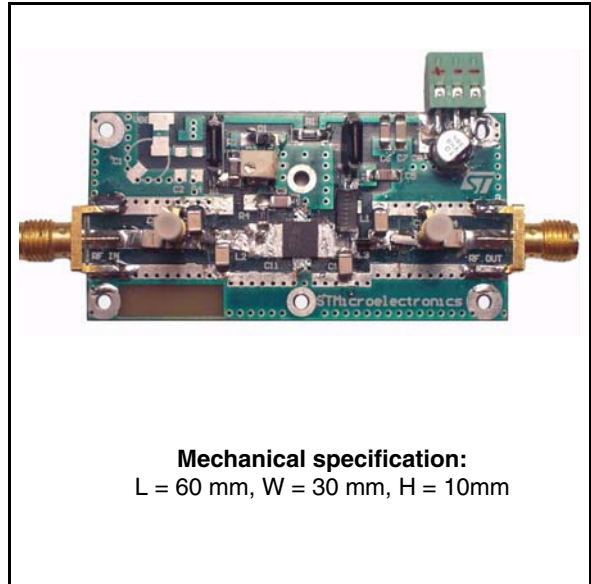


Table 1. Device summary

Order code
DB-55003L-512

Contents

1	Electrical data	3
	1.1 Maximum ratings	3
2	Electrical characteristics	4
3	Impedance	5
4	Typical performance	6
5	Test circuit	8
6	Mounting indications - PD55003L-E	11
7	Package mechanical data - PD55003L-E	12
8	Revision history	15

1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings ($T_{CASE} = 25^{\circ}C$)

Symbol	Parameter	Value	Unit
V_{DD}	Supply voltage	16	V
I_D	Drain Current	1	A
T_{CASE}	Operating Case Temperature	-20 to +85	$^{\circ}C$
P_{amb}	Max. Ambient Temperature	+55	$^{\circ}C$

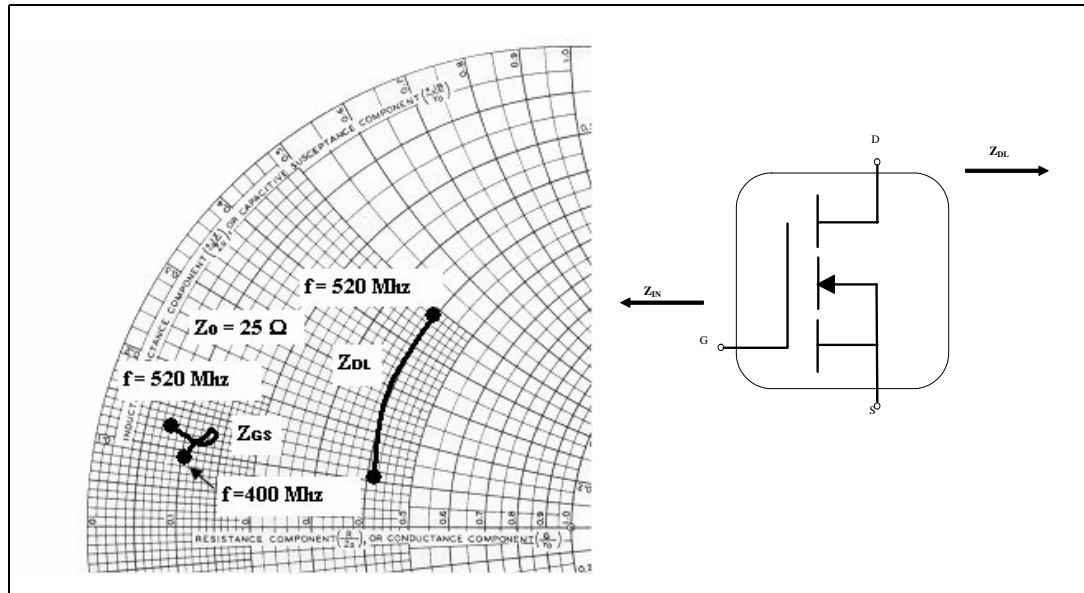
2 Electrical characteristics

Table 3. Electrical specification ($T_A = +25\text{ }^\circ\text{C}$, $V_{dd} = 12.5\text{ V}$, $I_{dq} = 80\text{ mA}$)

Symbol	Test conditions	Min	Typ	Max	Unit
Freq.	Frequency range	410		512	MHz
P_{OUT}		3	3.5		W
Gain	$P_{OUT} = 3\text{ W}$		15.8 ± 1.2		dB
ND	$P_{OUT} = 3\text{ W}$		$50 \div 57$		%
H2	2ND Harmonic @ $P_{OUT} = 3\text{ W}$		$-32 \div -46$		dBc
H3	3ND Harmonic @ $P_{OUT} = 3\text{ W}$		$-28 \div -54$		dBc
VSWR	Load mismatch all phases @ $P_{OUT} = 3\text{ W}$			20:1	

3 Impedance

Figure 1. Impedance data⁽¹⁾



1. Optimum board impedances into which the DUT operates, at a given DC bias and frequency band, to fulfill application requirements.

Table 4. Impedance data

F(MHz)	Z _{source}	Z _{DL}
400	2.4 + j 2.3	10.2 + j 2.8
420	2.6 + j 2.8	10.0 + j 4.2
440	3.0 + j 3.1	9.8 + j 5.5
460	3.2 + j 3.4	9.6 + j 7.2
480	3.3 + j 3.1	9.6 + j 8.7
500	2.8 + j 2.8	9.6 + j 10.3
520	1.8 + j 3.2	9.6 + j 12.1

4 Typical performance

Figure 2. Output power vs input power

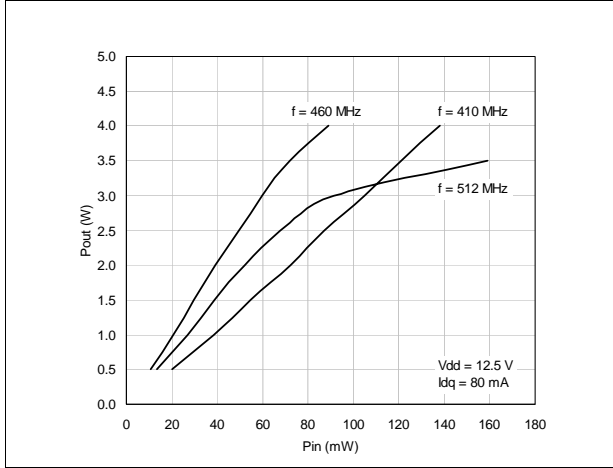


Figure 3. Efficiency vs output power

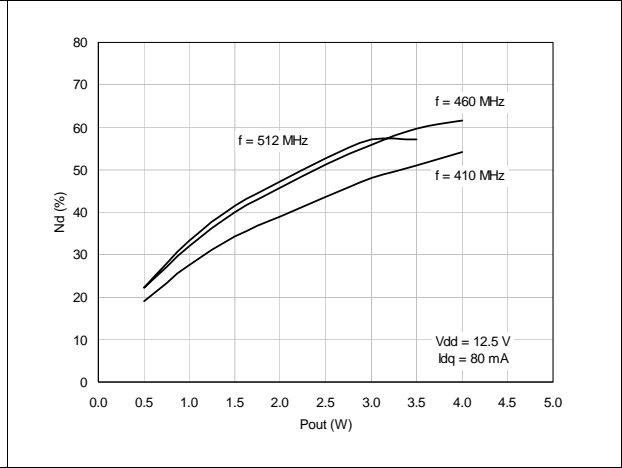


Figure 4. Power gain vs frequency

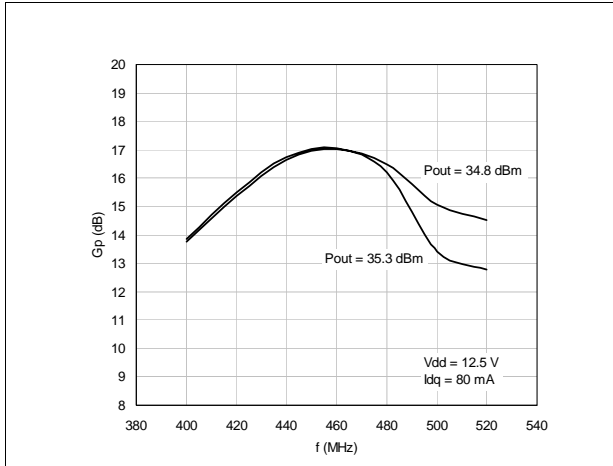


Figure 5. Efficiency vs frequency

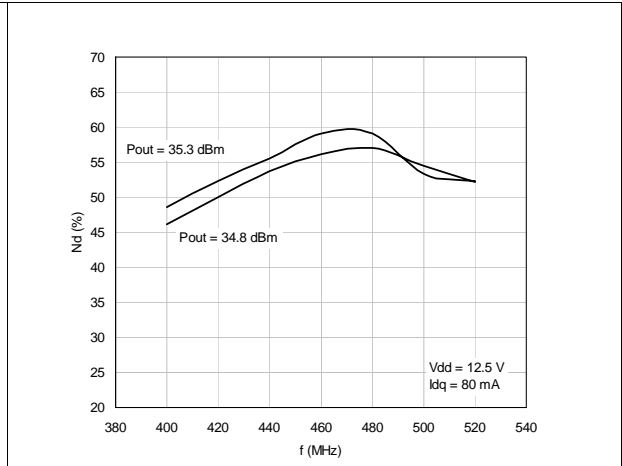


Figure 6. Input return loss vs frequency

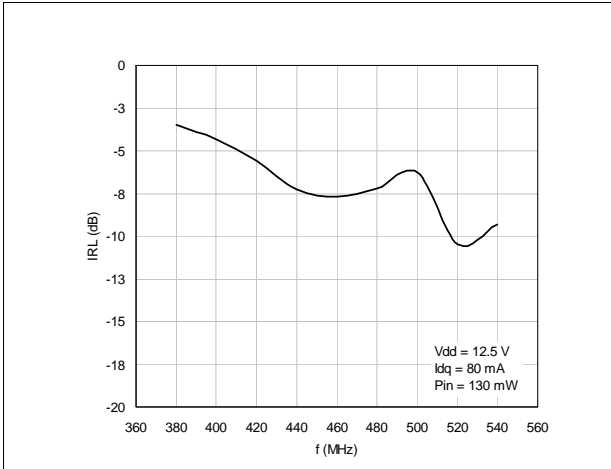


Figure 7. Harmonics vs frequency

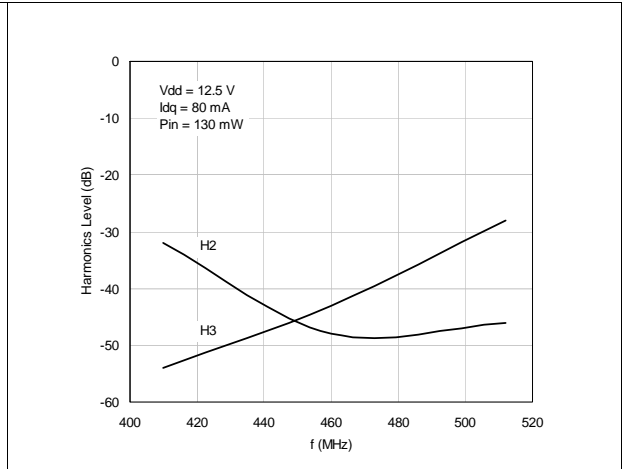
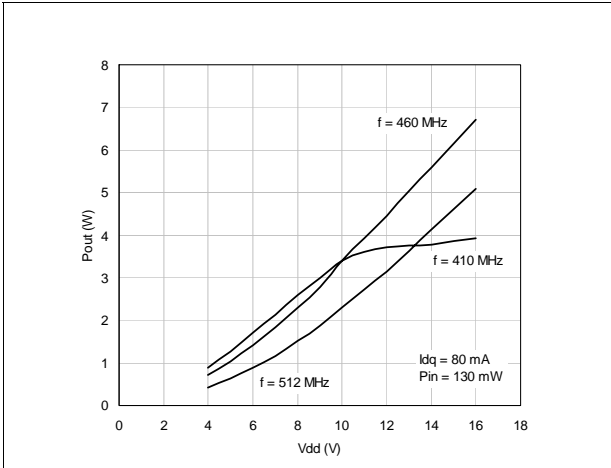
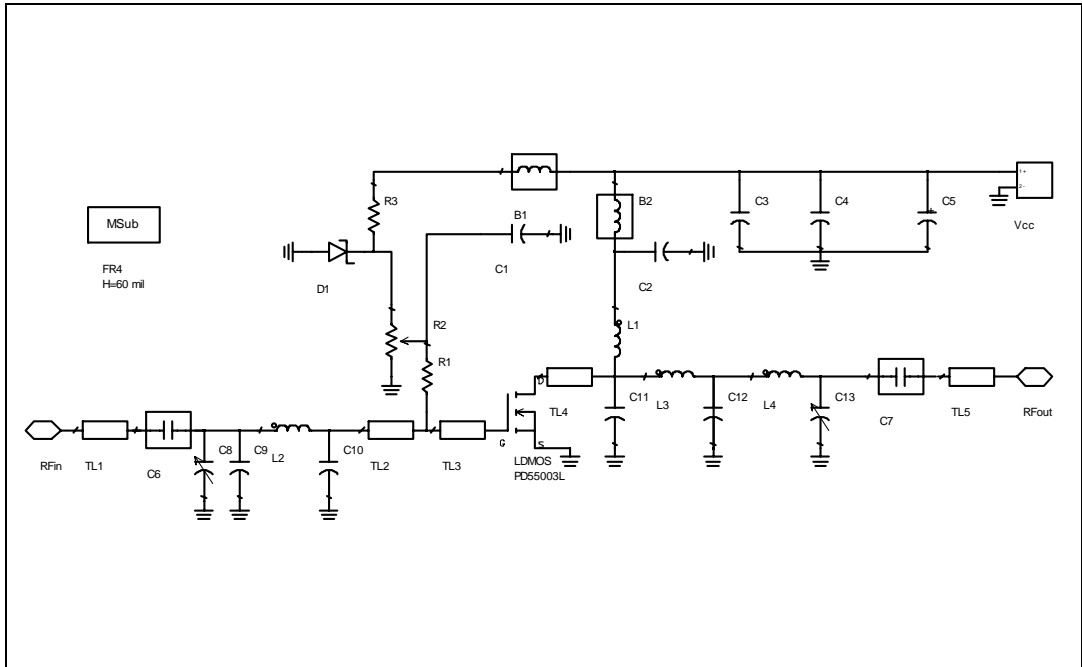


Figure 8. Output power vs drain voltage



5 Test circuit

Figure 9. Test circuit (1)



1. This electrical schematic MUST be intended only as an equivalent lumped circuit representation and it is NOT suitable for simulation.

Table 5. Test circuit component part list

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	GRM42-6C0G121J50
C3	Capacitor	1 nF	1206	Murata	GRM42-6C0G102J50
C4	Capacitor	10 nF	1206	Murata	GRM42-6X7R104K50
C5	Capacitor	10 uF	SMT	Panasonic	EEVHB1V100P
C6, C7	Capacitor	30 pF	100B	ATC	3R0
C8,C13	Variable capacitor	0.8 -:- 8 pF		Johnson	27293
C9	Capacitor	11 pF	100B	ATC	110
C10	Capacitor	39 pF	100B	ATC	390
C11	Capacitor	4.3 pF	100B	ATC	4R3
C12	Capacitor	15 pF	100B	ATC	150
D1	Zener diode	5.1 V	SOD110	Philips	BZX284C5V1
L1	Inductor	35.5 nH		Coilcraft	B09T
L2, L3	Inductor	5.4 nH		Coilcraft	0906-5
L4	Inductor	7.15 nH		Coilcraft	1606-7
R1	Resistor	15 Ω	1206	Tyco electronics	01623440-1
R2	Potentiometer	10 K Ω		Bourns electronics	3214W-1-103E
R3	Resistor	1 K	1206	Tyco electronics	01623440-1
TL1	Transmission line	-	W = 2.87 mm, L = 8.6 mm		
TL2	Transmission line	-	W = 2.87 mm, L = 4.33 mm		
TL3, TL4	Transmission line	-	W = 4.9 mm, L = 5.7 mm		
TL5	Transmission line	-	W = 2.87 mm, L = 8.6 mm		
RF in, RF out	SMA-CONN	50 Ω	60 mils	JOHNSON	142-0701-801
PD55003L-E	LDMOS			STMicroelectronics	PD55003L-E
Board	FR-4 THk=0.060" 2OZ Cu both sides				

Figure 10. Test fixture component layout

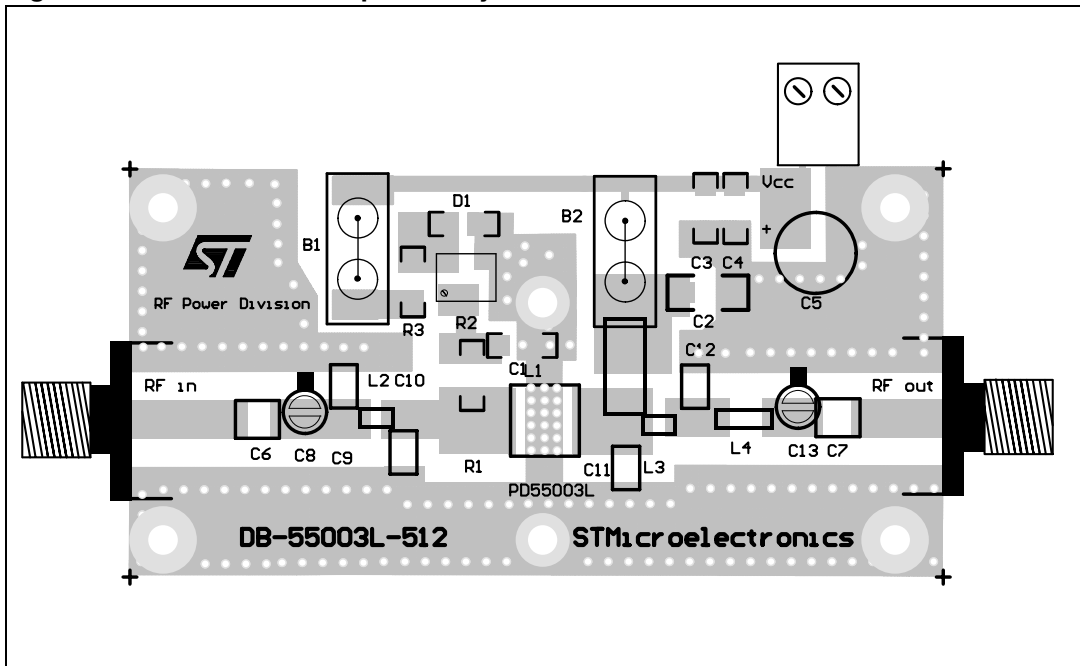
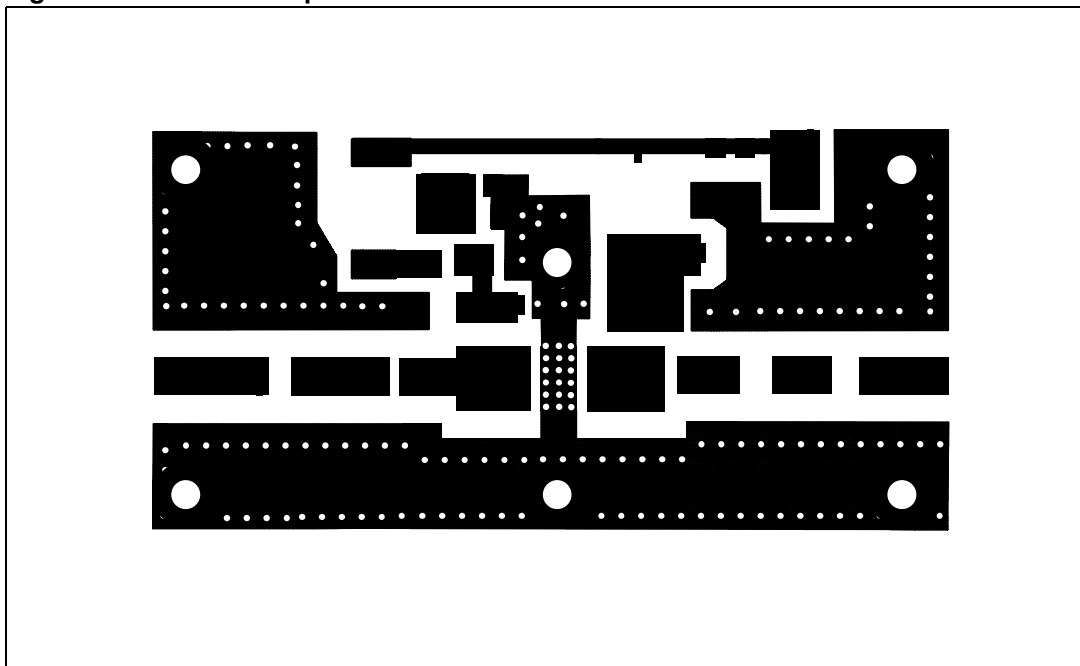
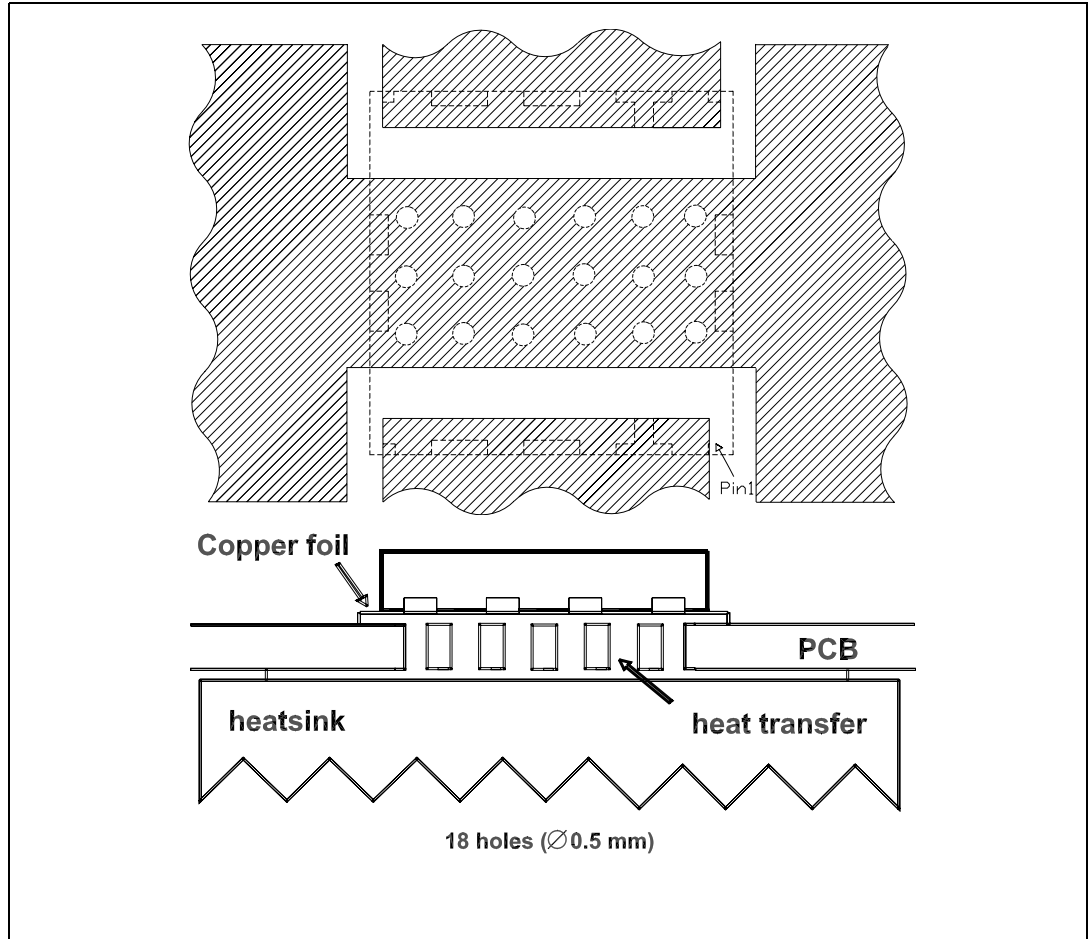


Figure 11. Test circuit photomaster



6 Mounting indications - PD55003L-E

Figure 12. Standard SMD mounting



7 Package mechanical data - PD55003L-E

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

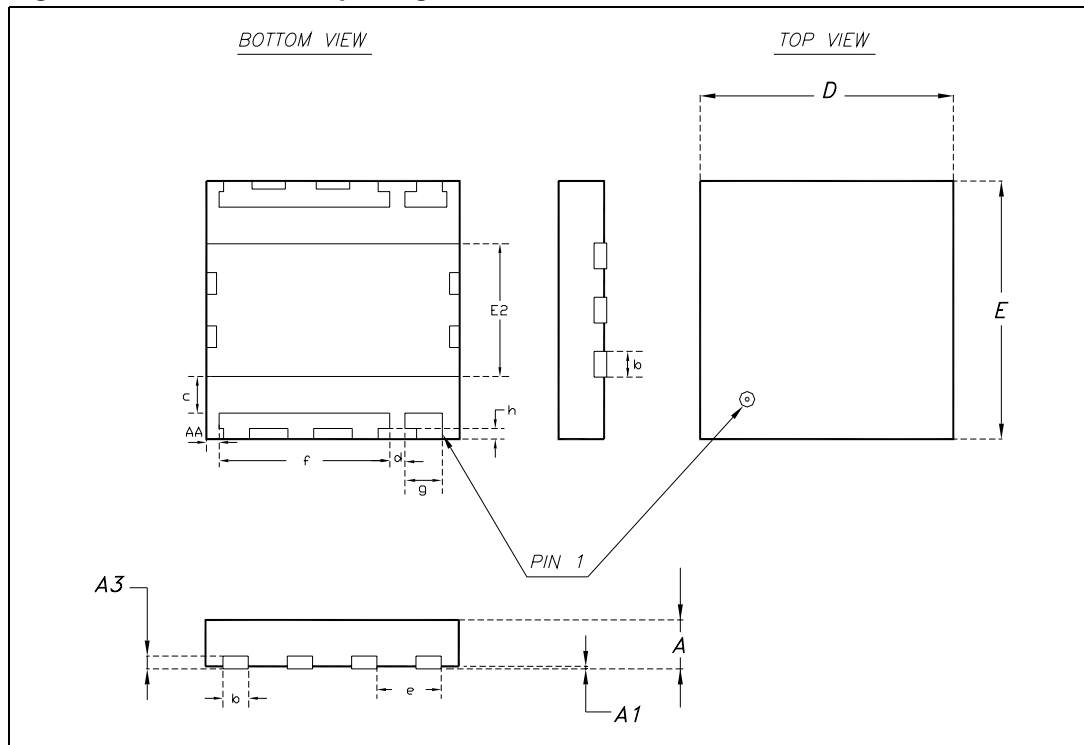
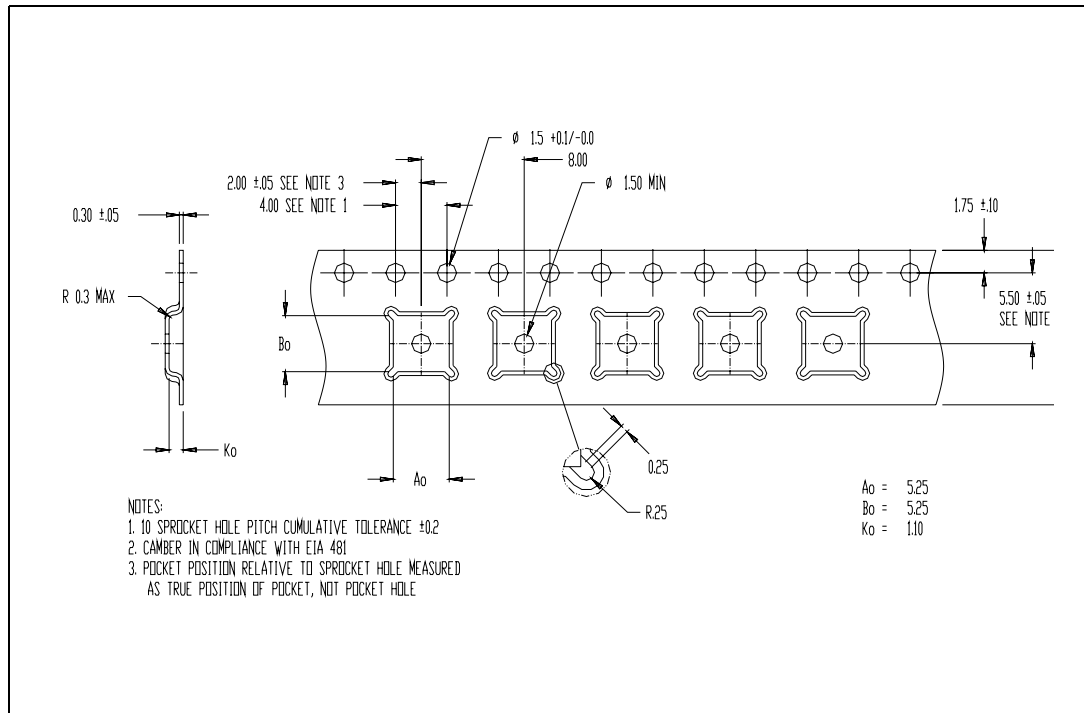


Table 7. PowerFLAT™ tape and reel dimensions

Dim.	mm.		
	Min.	Typ	Max.
Ao	5.15	5.25	5.35
Bo	5.15	5.25	5.35
Ko	1.0	1.1	1.2

Figure 14. PowerFLAT™ tape and reel



8 Revision history

Table 8. Document revision history

Date	Revision	Changes
11-Jan-2006	1	Initial release.
11-Dec-2007	2	Updated coverpage title, description and Table 5 on page 9

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.

© 2007 STMicroelectronics - All rights reserved

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