



SD3932

RF power transistors HF/VHF/UHF N-channel MOSFETs

Features

- Excellent thermal stability
- Common source push-pull configuration
- $P_{OUT} = 350 \text{ W min.}$
with 26.8 dB gain @ 123 MHz
- In compliance with the 2002/95/EC
European directive

Description

The SD3932 is an N-channel MOS field-effect RF power transistor. It is intended for use in 100V DC large signal applications up to 250 MHz.

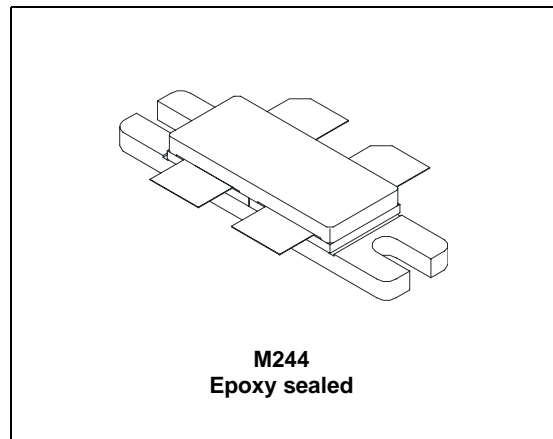


Figure 1. Pin connection

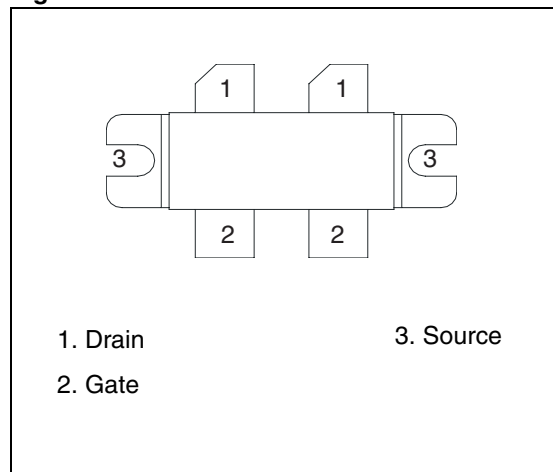


Table 1. Device summary

Order code	Marking	Package	Packaging
SD3932	SD3932	M244	Plastic tray

Contents

1	Electrical data	3
	1.1 Maximum ratings	3
	1.2 Thermal data	3
2	Electrical characteristics	4
	2.1 Static	4
	2.2 Dynamic	4
3	Impedance data	5
4	Typical performance	6
5	Test circuit	9
6	Circuit layout	10
7	Package mechanical data	11
8	Revision history	13

1 Electrical data

1.1 Maximum ratings

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

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}^{(1)}$	Drain source voltage	250	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 1\text{ M}\Omega$)	250	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current	20	A
P_{DISS}	Power dissipation	500	W
T_J	Max. operating junction temperature	200	$^{\circ}\text{C}$
T_{STG}	Storage temperature	-65 to +150	$^{\circ}\text{C}$

1. $T_J = 150\text{ °C}$

1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	0.35	$^{\circ}\text{C/W}$

2 Electrical characteristics

$$T_{\text{CASE}} = +25\text{ }^{\circ}\text{C}$$

2.1 Static

Table 4. Static (per side)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}^{(1)}$	$V_{\text{GS}} = 0\text{ V}$	$I_{\text{DS}} = 100\text{ mA}$	250			V
I_{DSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$			1	mA
I_{GSS}	$V_{\text{GS}} = 20\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			250	nA
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 250\text{ mA}$	1.5	2.5	4.0	V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$	$I_{\text{D}} = 5\text{ A}$		2.5	3.5	V
G_{FS}	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 2.5\text{ A}$	2.5			S
C_{ISS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		500		pF
C_{OSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		134		pF
C_{RSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 100\text{ V}$		6		pF

1. $T_{\text{J}} = 150\text{ }^{\circ}\text{C}$

2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions		Min.	Typ.	Max.	Unit
$P_{1\text{dB}}$	$V_{\text{DD}} = 100\text{ V}$	$I_{\text{DQ}} = 2 \times 250\text{ mA}$ $f = 123\text{ MHz}$	350	425		W
G_{PS}	$V_{\text{DD}} = 100\text{ V}$, $I_{\text{DQ}} = 2 \times 250\text{ mA}$, $P_{\text{OUT}} = 350\text{ W}$, $f = 123\text{ MHz}$			26.8		dB
h_{D}	$V_{\text{DD}} = 100\text{ V}$, $I_{\text{DQ}} = 2 \times 250\text{ mA}$, $P_{\text{OUT}} = 350\text{ W}$, $f = 123\text{ MHz}$			66		%
Load mismatch	$V_{\text{DD}} = 100\text{ V}$, $I_{\text{DQ}} = 2 \times 250\text{ mA}$, $P_{\text{OUT}} = 300\text{ W}$, $f = 123\text{ MHz}$ All phase angles		3:1			VSWR

3 Impedance data

Figure 2. Impedance data

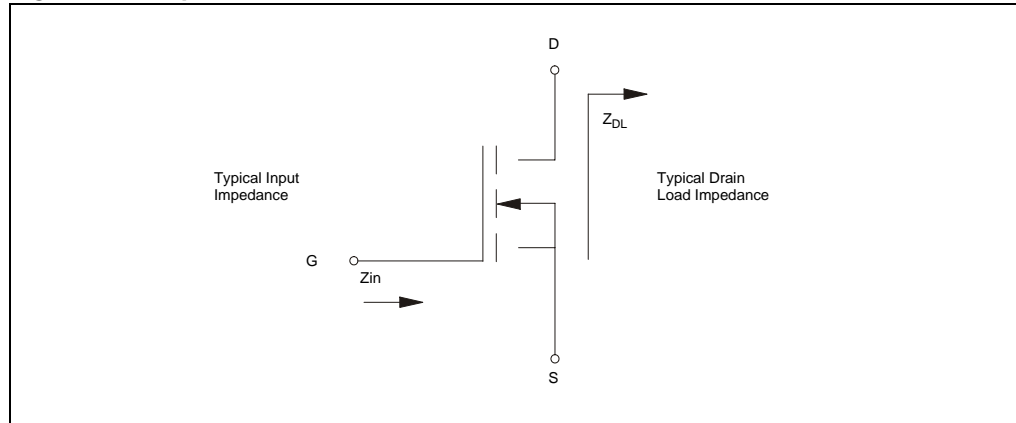


Table 6. Impedance data

Freq	Z_{IN} (Ω)	Z_{DL} (Ω)
123 MHz (800 W peak)	$1.4 - j 5.5$	$6.4 + j 10.2$
123 MHz (350 W CW)	$0.7 - j 3.9$	$3.2 + j 15$

4 Typical performance

Figure 3. Capacitances vs voltage

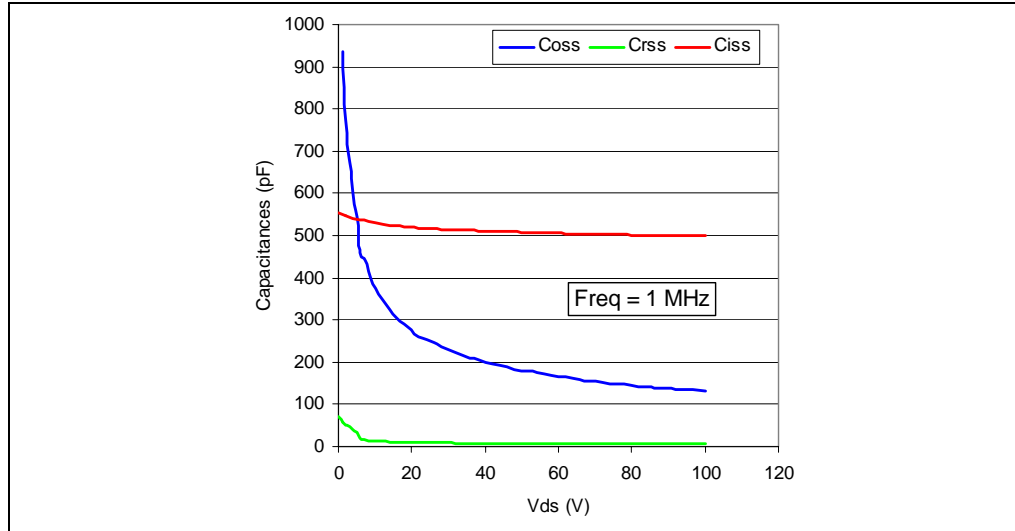


Figure 4. Transient thermal impedance

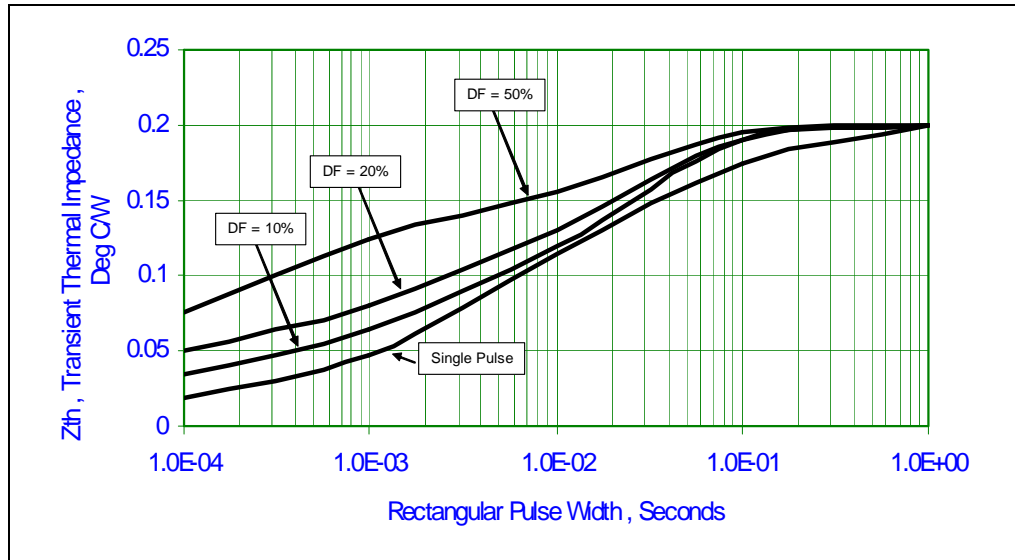


Figure 5. Maximum safe operating area

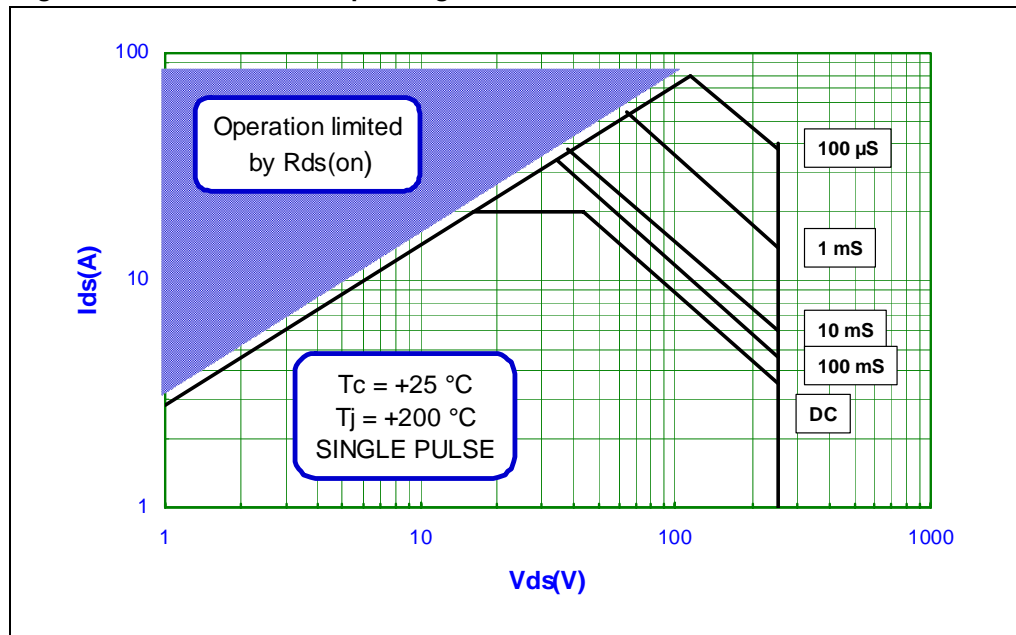


Figure 6. Zero temperature coefficient point

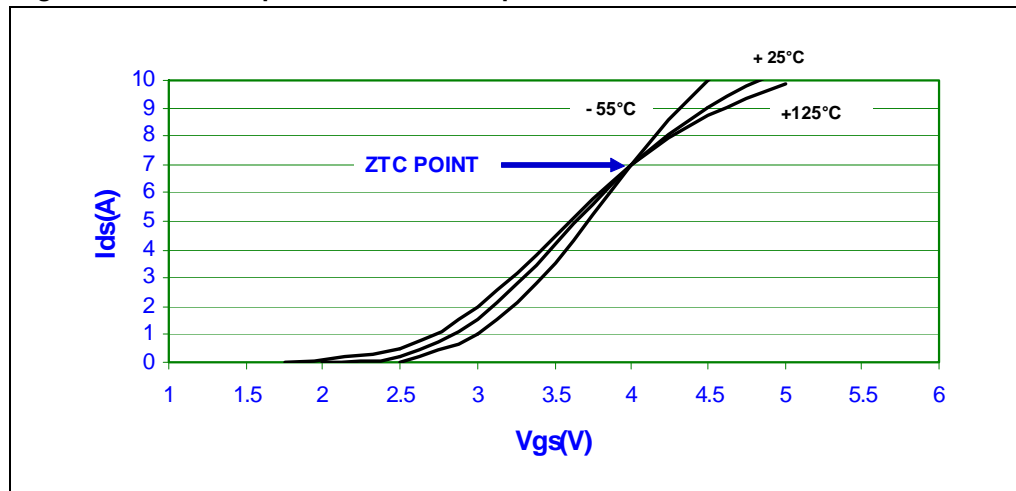


Figure 7. Pout and efficiency vs pin - CW

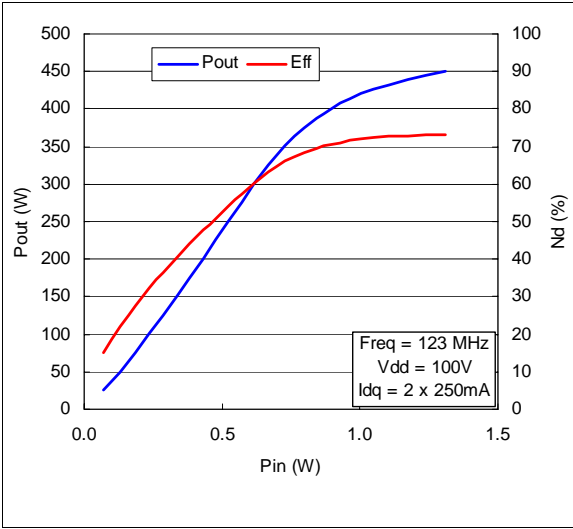


Figure 8. Gain vs output power - CW

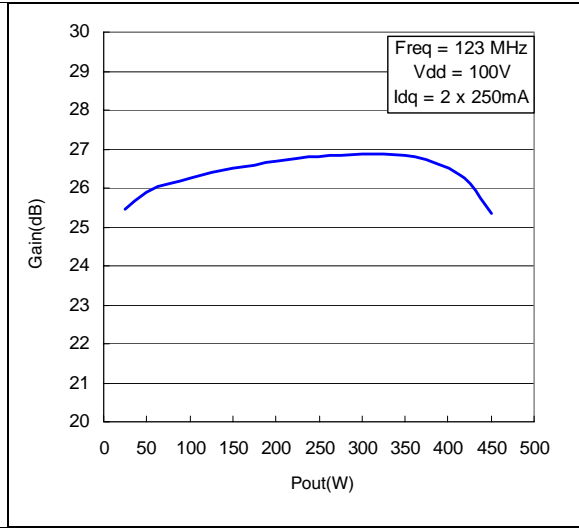


Figure 9. Pout and efficiency vs pin power 1 msec - 10 %

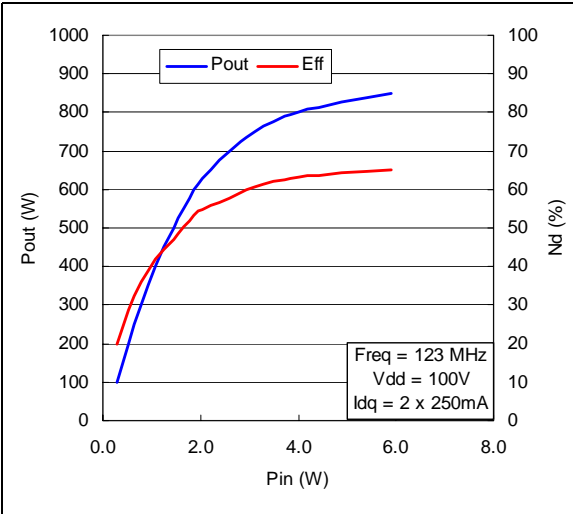
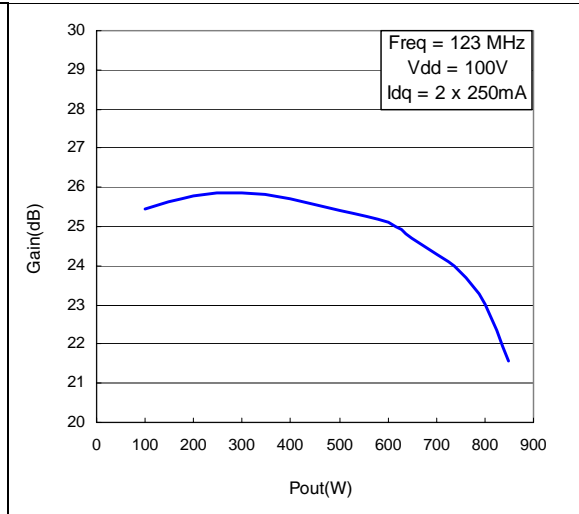


Figure 10. Gain vs output power 1 msec - 10 %



5 Test circuit

Figure 11. Test circuit

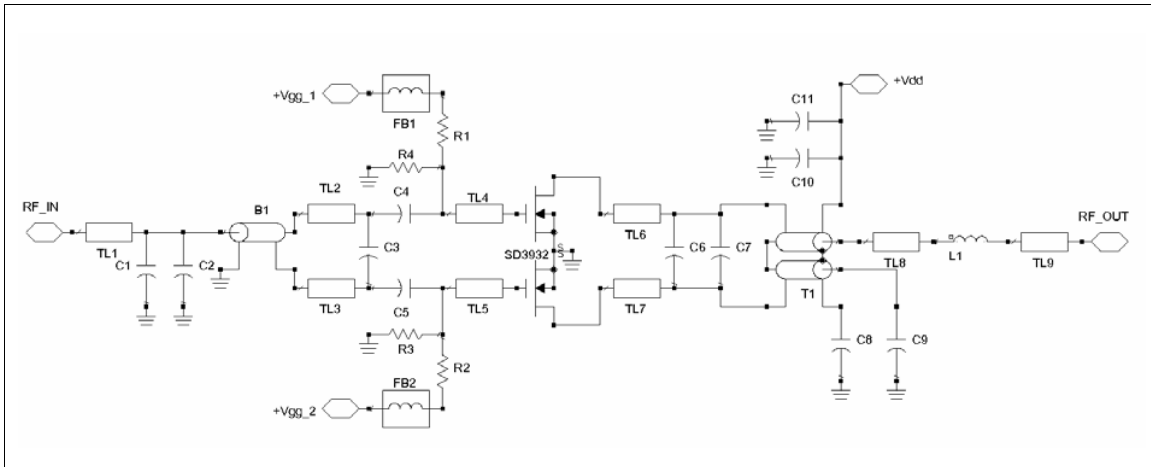


Table 7. Bill of materials

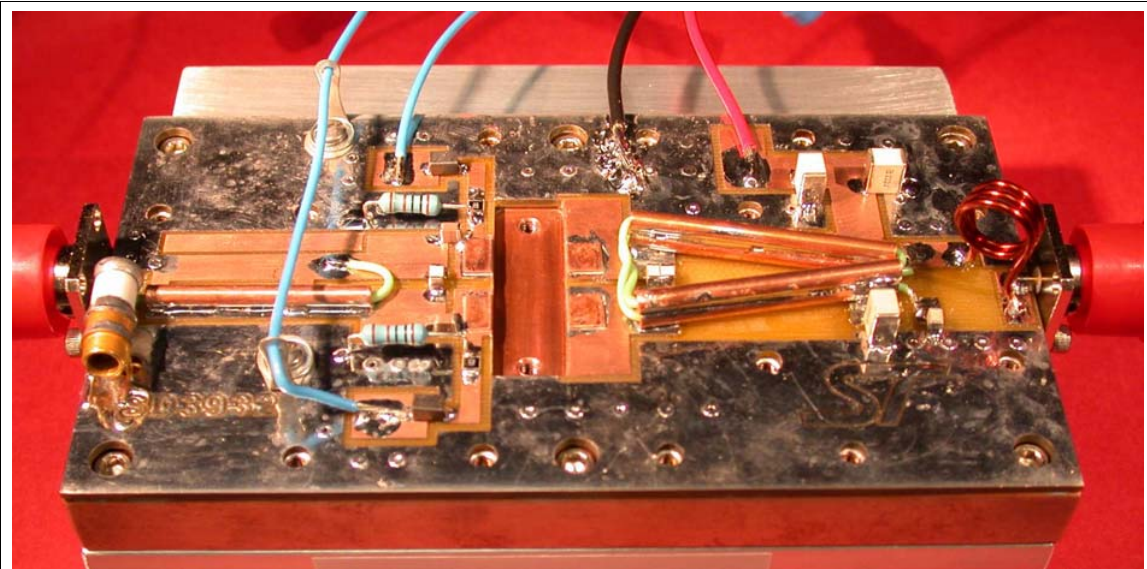
Component	Description
C1	120 pF ATC 100B chip capacitor
C2	1-20 pF Johanson variable capacitor
C3	51 pF ATC 100B chip capacitor
C4, C5	750 pF ATC 700B chip capacitor
C6	43 pF ATC 100B chip capacitor
C7	20 pF ATC 100B chip capacitor
C8	1000 pF ATC 100C chip capacitor
C9	43 pF ATC 100B chip capacitor
C10	2200 pF ATC 100C chip capacitor
C11	1200 pF ATC 100C chip capacitor
R1, R2	1 k Ω 1/4 watt chip resistor
R3, R4	1 k Ω 1/2 watt axial lead resistor
L1	3 turns, 16 ga magnet wire, Id 3/8", 95 nH
FB1, FB2	Fair-rite # 2743019447
B1	20 ga teflon coated wire thru copper tube OD 1/8"x 1.3"
T1	20 ga teflon coated wire thru 4 copper tubes OD 1/8"x 1.5"
TL1	0.135" x 0.155" microstrip
TL2, TL3	0.420" x 0.350" microstrip

Table 7. Bill of materials (continued)

Component	Description
TL4, TL5	0.220" x 0.350" microstrip
TL6, TL7	0.350" x 0.660" microstrip
TL8	0.225" x 0.200" microstrip
TL9	0.175" x 0.250" microstrip
Board	0.062" FR-4

6 Circuit layout

Figure 12. Circuit layout photo



7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

Table 8. M244 (.400 x .860 4/L BAL N/HERM W/FLG) mechanical data

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A	5.59		5.84	0.220		0.230
B		5.08			0.200	
C	3.02		3.28	0.119		0.129
D	9.65		9.91	0.380		0.390
E	19.81		20.82	0.780		0.820
F	10.92		11.18	0.430		0.440
G		27.94			1.100	
H	33.91		34.16	1.335		1.345
I	0.10		0.15	0.004		0.006
J	1.52		1.78	0.060		0.070
K	2.59		2.84	0.102		0.112
L	4.83		5.84	0.190		0.230
M	10.03		10.34	0.395		0.407
N	21.59		22.10	0.850		0.870

Figure 13. Package dimensions



8 Revision history

Table 9. Document revision history

Date	Revision	Changes
09-Sep-2003	1	First release
03-Jul-2007	2	Specification upgrade
07-Aug-2007	3	Updated: Cover page, Figure 7, 8, 9, 10 on page 8
31-Oct-2007	4	Updated: Table 4: Static (per side) on page 4 Added Section 5: Test circuit on page 9 , Section 6: Circuit layout on page 10
16-Oct-2008	5	Updated: Table 4: Static (per side) on page 4
07-Sep-2010	6	Updated features on cover page.

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.

© 2010 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 - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com