



PD57030-E PD57030S-E

RF POWER transistor, LDMOST plastic family N-Channel enhancement-mode lateral MOSFETs

General features

- Excellent thermal stability
- Common source configuration
- $P_{OUT} = 30W$ with 14dB gain @ 945MHz / 28V
- New RF plastic package

Description

The PD57030 is a common source N-Channel, enhancement-mode lateral Field-Effect RF power transistor. It is designed for high gain, broad band commercial and industrial applications. It operates at 28 V in common source mode at frequencies up to 1 GHz.

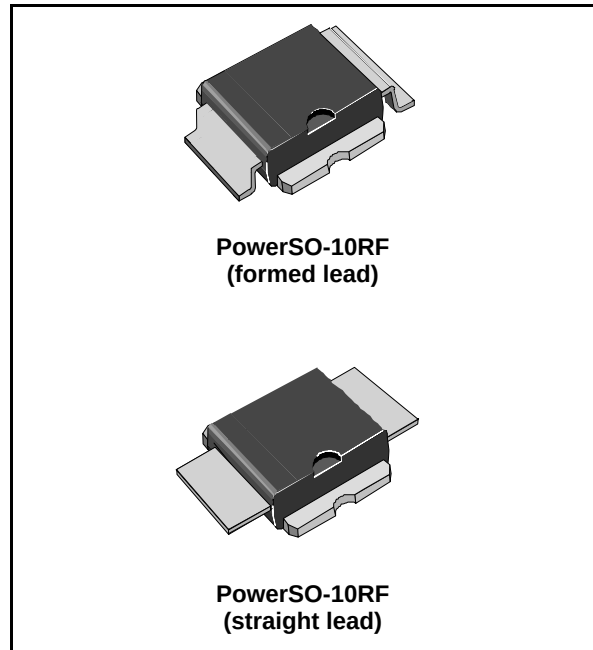
PD57030 boasts the excellent gain, linearity and reliability of ST's latest LDMOS technology mounted in the first true SMD plastic RF power package, PowerSO-10RF. PD57030's superior linearity performance makes it an ideal solution for base station applications.

The PowerSO-10 plastic package, designed to offer high reliability, is the first ST JEDEC approved, high power SMD package. It has been specially optimized for RF needs and offers excellent RF performances and ease of assembly.

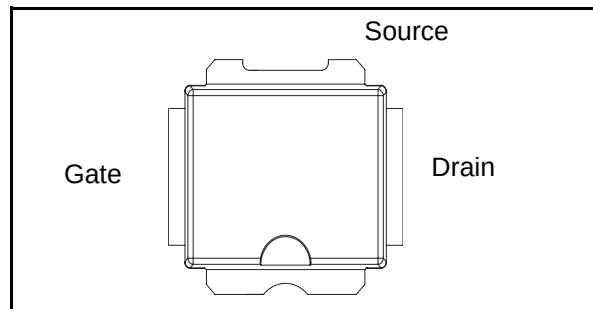
Mounting recommendations are available in www.st.com/rf/ (look for application note AN1294)

Order codes

Part number	Package	Packing
PD57030-E	PowerSO-10RF (formed lead)	Tube
PD57030S-E	PowerSO-10RF (straight lead)	Tube
PD57030TR-E	PowerSO-10RF (formed lead)	Tape and reel
PD57030STR-E	PowerSO-10RF (straight lead)	Tape and reel



Pin connection



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 5

4 Typical performance 6

5 Test circuit 10

6 Package mechanical data 12

7 Revision history 17

1 Electrical data

1.1 Maximum ratings

Table 1. Absolute maximum ratings ($T_{CASE} = 25^{\circ}C$)

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	65	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current	4	A
P_{DISS}	Power dissipation (@ $T_C = 70^{\circ}C$)	52.8	W
T_J	Max. operating junction temperature	165	$^{\circ}C$
T_{STG}	Storage temperature	-65 to +150	$^{\circ}C$

1.2 Thermal data

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Junction - case thermal resistance	1.8	$^{\circ}C/W$

2 Electrical characteristics

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

2.1 Static

Table 3. Static

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{ V}$	$I_{\text{DS}} = 10\text{ mA}$	65			V
I_{DSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$			1	μA
I_{GSS}	$V_{\text{GS}} = 20\text{ V}$	$V_{\text{DS}} = 0\text{ V}$			1	μA
$V_{\text{GS(Q)}}$	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{D}} = 50\text{ mA}$	2.0		5.0	V
$V_{\text{DS(ON)}}$	$V_{\text{GS}} = 10\text{ V}$	$I_{\text{D}} = 3\text{ A}$		1.3		V
g_{FS}	$V_{\text{DS}} = 10\text{ V}$	$I_{\text{D}} = 3\text{ A}$		1.8		mho
C_{ISS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		57		pF
C_{OSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		30		pF
C_{RSS}	$V_{\text{GS}} = 0\text{ V}$	$V_{\text{DS}} = 28\text{ V}$		2.3		pF

2.2 Dynamic

Table 4. Dynamic

Symbol	Test conditions		Min	Typ	Max	Unit
P_{OUT}	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{DQ}} = 50\text{ mA}$ $f = 945\text{ MHz}$	30			W
G_{P}	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{DQ}} = 50\text{ mA}$ $P_{\text{OUT}} = 30\text{ W}$ $f = 945\text{ MHz}$	13	14		dB
η_{D}	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{DQ}} = 50\text{ mA}$ $P_{\text{OUT}} = 30\text{ W}$ $f = 945\text{ MHz}$	45	53		%
Load mismatch	$V_{\text{DS}} = 28\text{ V}$	$I_{\text{DQ}} = 50\text{ mA}$ $P_{\text{OUT}} = 30\text{ W}$ $f = 945\text{ MHz}$ ALL PHASE ANGLES	10:1			VSWR

3 Impedance

Figure 1. Current conventions

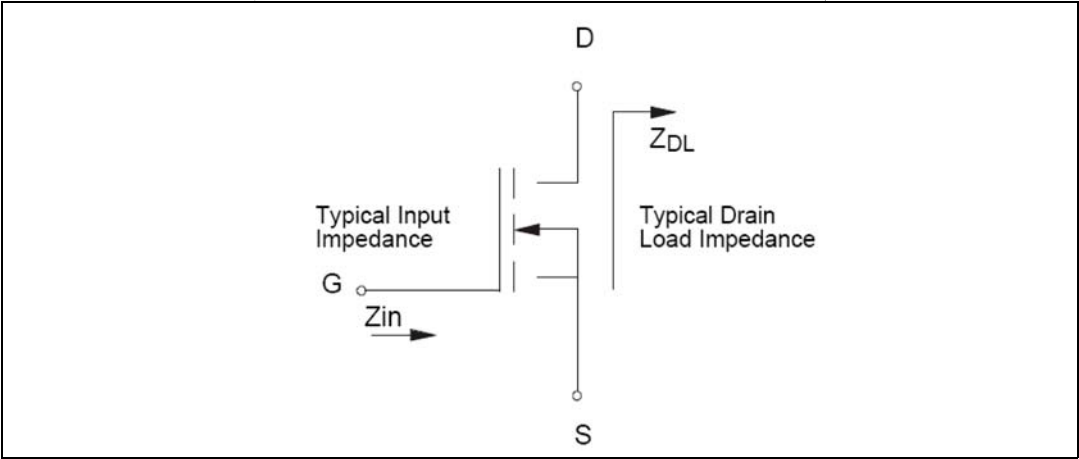


Table 5. Impedance data

Freq. (MHz)	$Z_{IN} (\Omega)$	$Z_{DL}(\Omega)$
925	$0.929 - j\ 0.315$	$2.60 + j\ 1.45$
945	$0.809 - j\ 0.085$	$2.46 + j\ 0.492$
960	$0.763 - j\ 0.428$	$2.35 + j\ 0.591$

4 Typical performance

Figure 2. Capacitance vs supply voltage

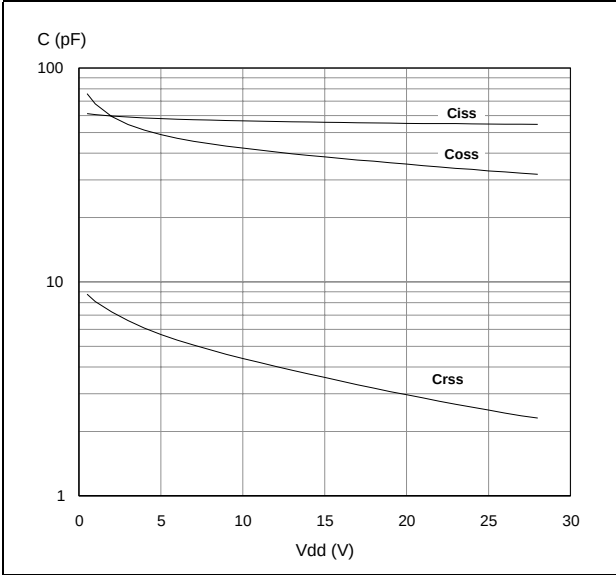


Figure 3. Drain current vs gate source voltage

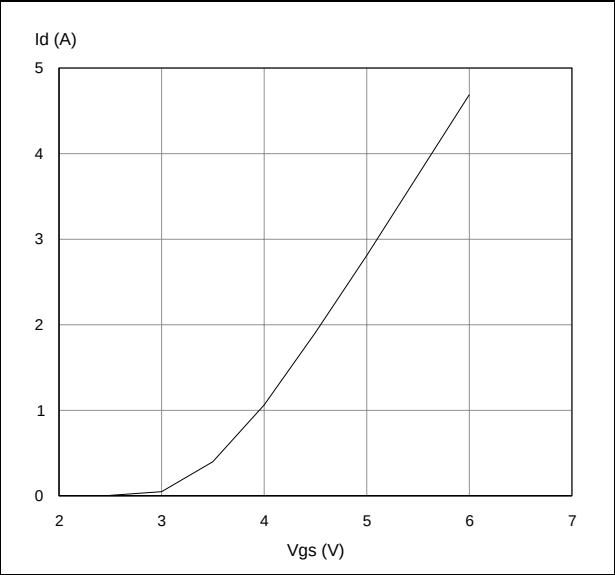
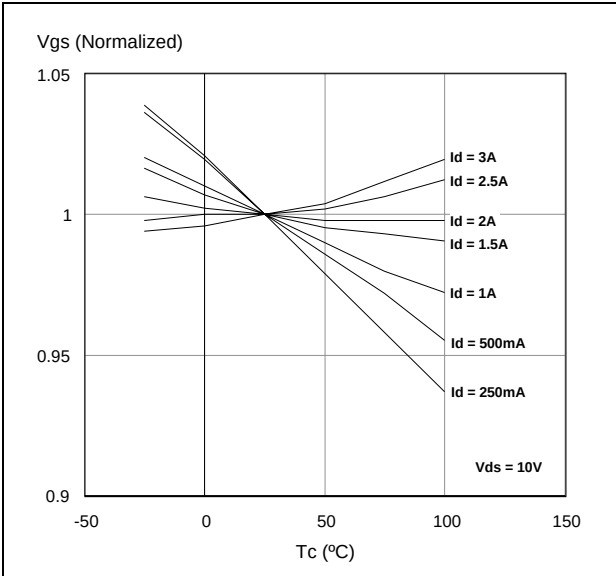


Figure 4. Gate-source voltage vs case temperature



PD57030S

Figure 5. Output power vs input power

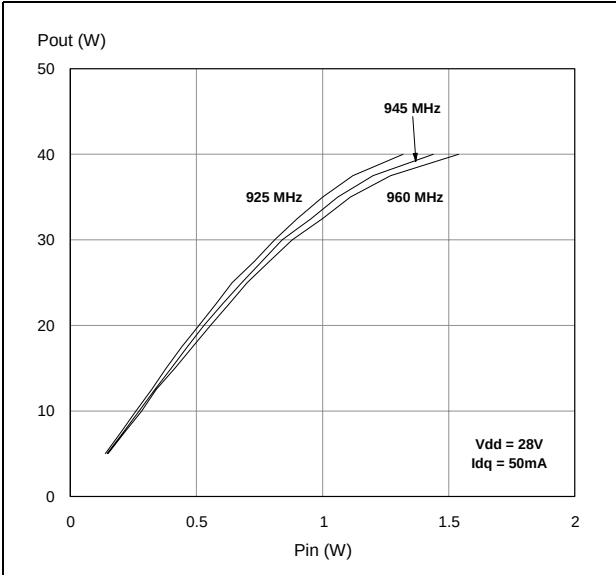


Figure 6. Input return loss vs output power

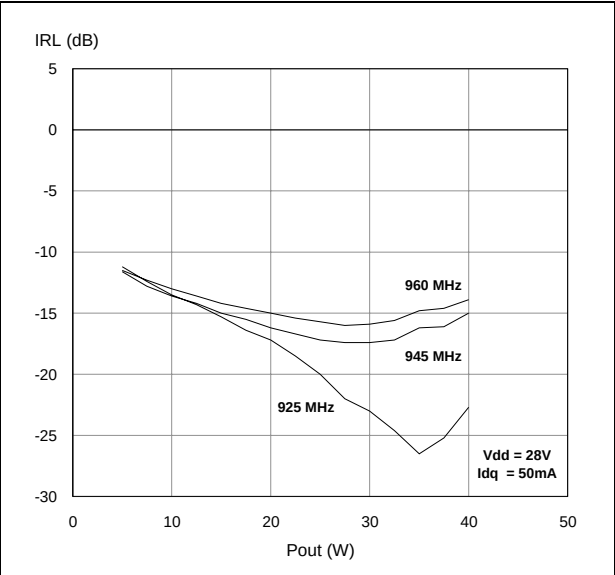


Figure 7. Power gain vs output power

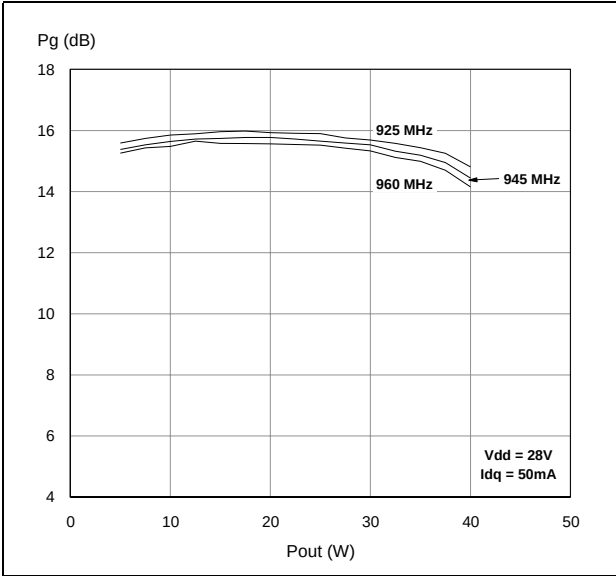


Figure 8. Efficiency vs output power

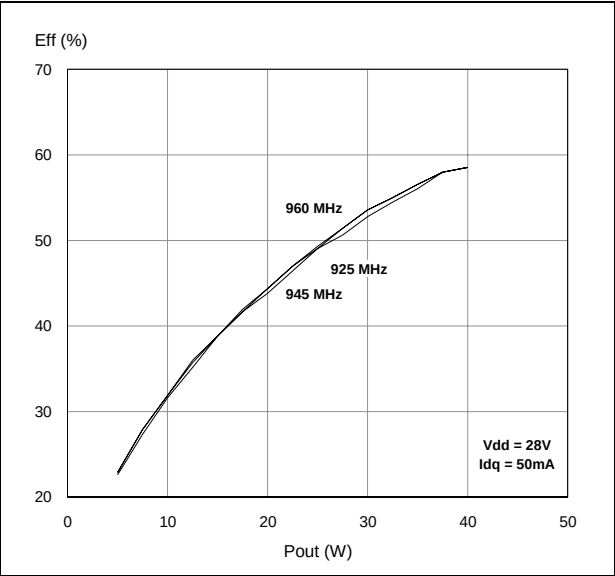


Figure 9. Output power vs bias current

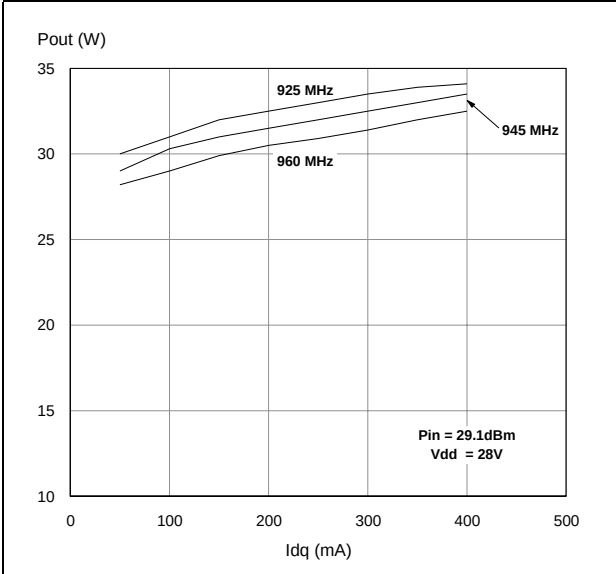


Figure 10. Efficiency vs bias current

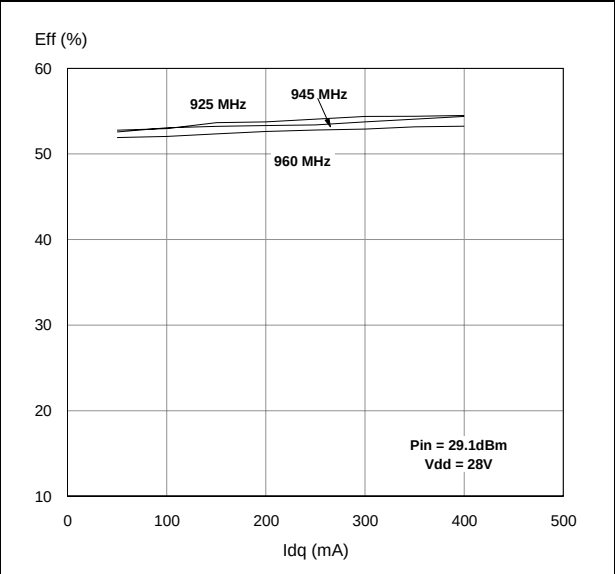


Figure 11. Output power vs drain voltage

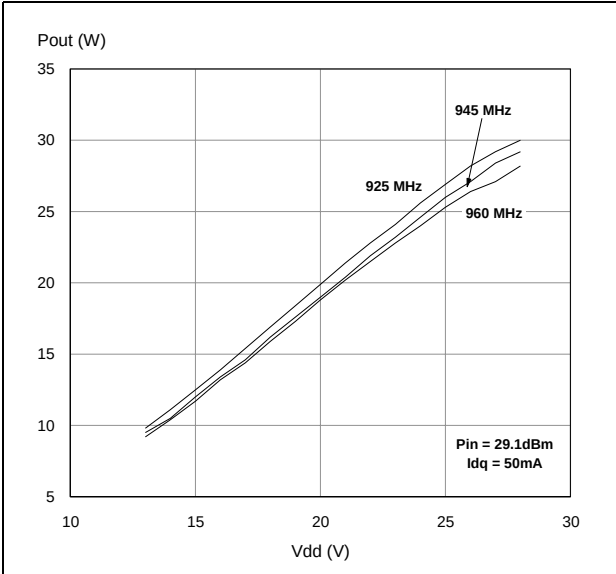


Figure 12. Efficiency vs drain voltage

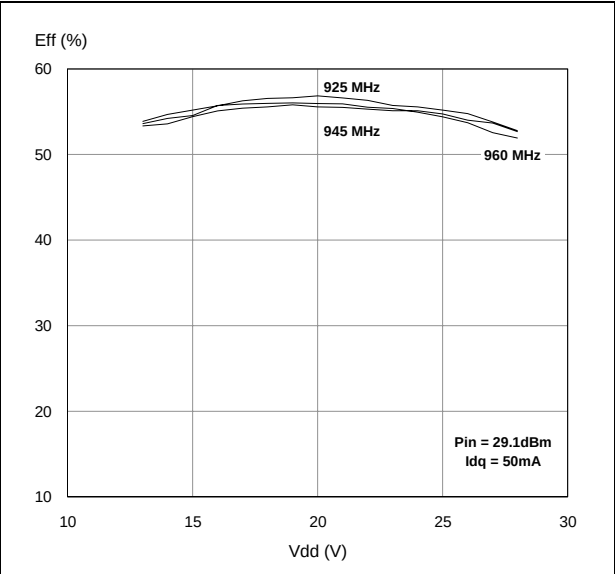
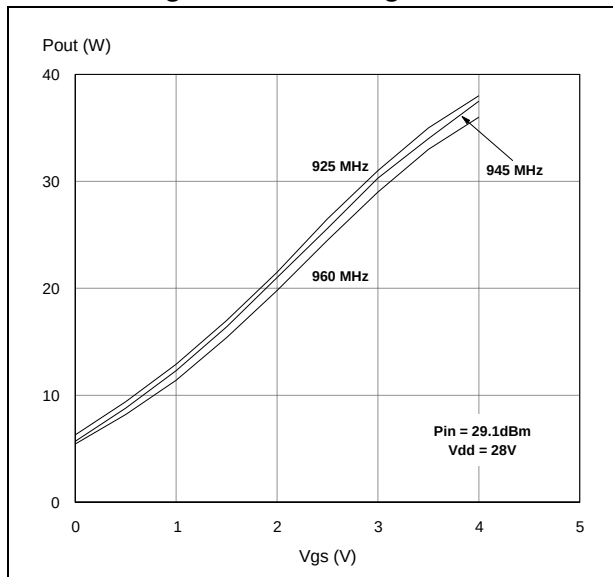


Figure 13. Output power vs gate-source voltage

5 Test circuit

Figure 14. Test circuit schematic

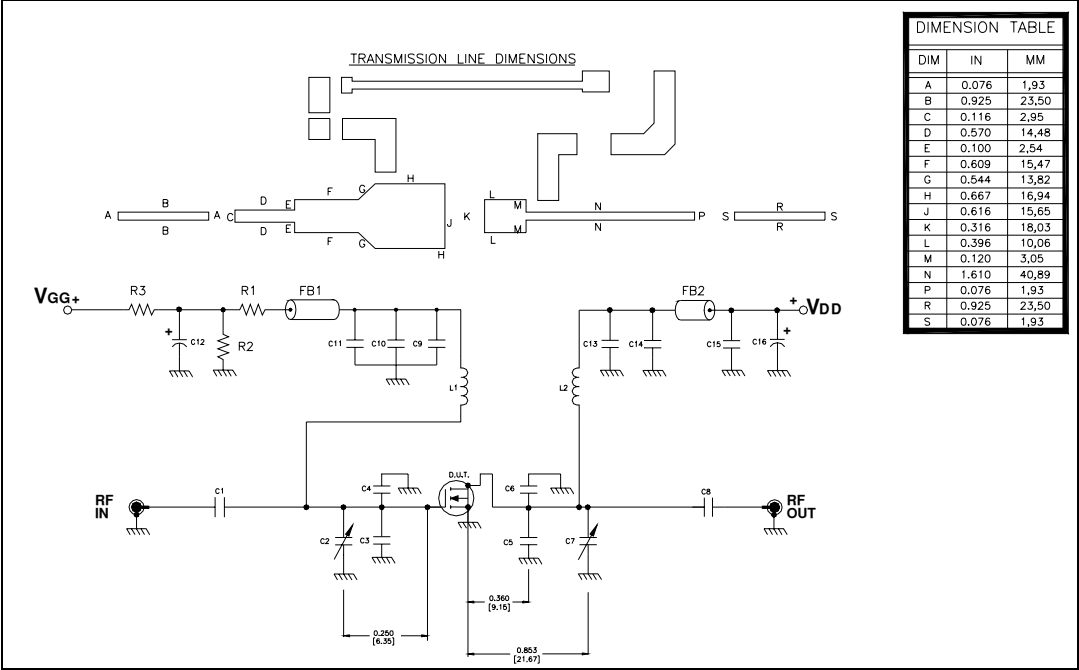


Table 6. Test circuit component part list

Component	Description
C1, C8, C9, C13	47pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C2, C7	0.8-8.0pF GIGA TRIM VARIABLE CAPACITOR
C3, C4, C5, C6	7.5pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C10	1000pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C11, C15	0.1μF / 500V SURFACE MOUNT CERAMIC CHIP CAPACITOR
C12	10μF / 50V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR
C14	100pF ATC 100B SURFACE MOUNT CERAMIC CHIP CAPACITOR
C16	220μF / 63V ALUMINUM ELECTROLYTIC RADIAL LEAD CAPACITOR
R1	18KΩ 1W SURFACE MOUNT CHIP RESISTOR
R2	4.7MΩ 1W SURFACE MOUNT CHIP RESISTOR
R3	120Ω 2W SURFACE MOUNT CHIP RESISTOR
FB1, FB2	SHIELD BEAD SURFACE MOUNT EMI
L1, L2	INDUCTOR, 5TURNS AIR WOUND #22AWG, ID=0.059[1.49], NYLON COATED MAGNET WIRE

Figure 15. Test circuit photomaster

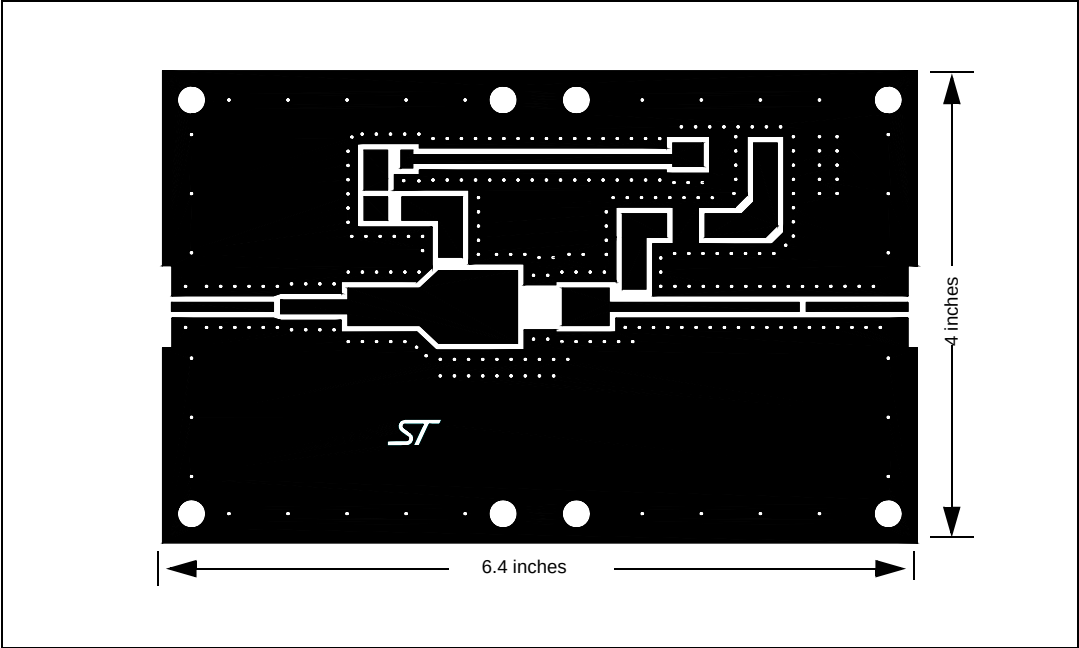
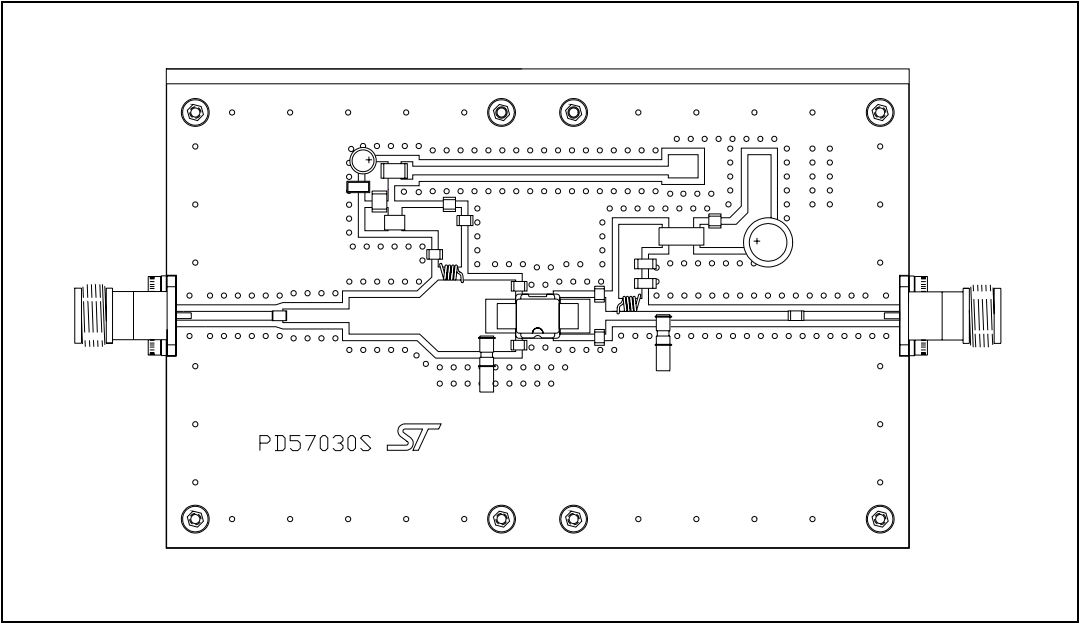


Figure 16. Test circuit



6 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 7. PowerSO-10RF Formed lead (Gull Wing) Mechanical data

Dim.	mm.			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1	0	0.05	0.1	0.	0.0019	0.0038
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	13.85	14.1	14.35	0.544	0.555	0.565
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
L	0.8	1	1.1	0.030	0.039	0.042
R1			0.25			0.01
R2		0.8			0.031	
T	2 deg	5 deg	8 deg	2 deg	5 deg	8 deg
T1		6 deg			6 deg	
T2		10 deg			10 deg	

Note: Resin protrusions not included (max value: 0.15 mm per side)

Figure 17. Package dimensions

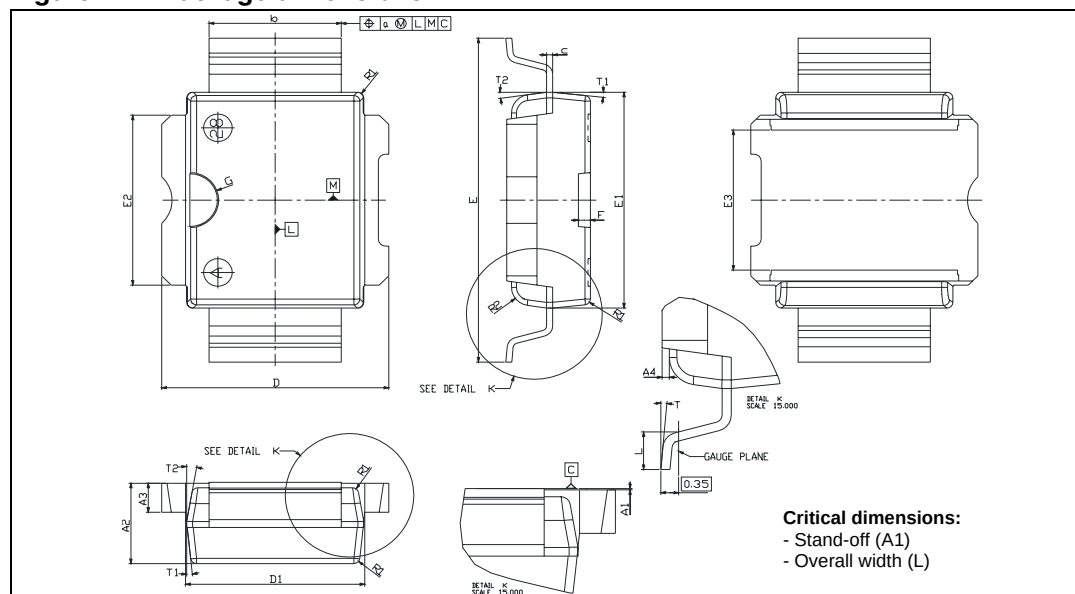


Table 8. PowerSO-10RF Straight Lead Mechanical data

Dim.	mm.			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A1	1.62	1.67	1.72	0.064	0.065	0.068
A2	3.4	3.5	3.6	0.134	0.137	0.142
A3	1.2	1.3	1.4	0.046	0.05	0.054
A4	0.15	0.2	0.25	0.005	0.007	0.009
a		0.2			0.007	
b	5.4	5.53	5.65	0.212	0.217	0.221
c	0.23	0.27	0.32	0.008	0.01	0.012
D	9.4	9.5	9.6	0.370	0.374	0.377
D1	7.4	7.5	7.6	0.290	0.295	0.298
E	15.15	15.4	15.65	0.595	0.606	0.615
E1	9.3	9.4	9.5	0.365	0.37	0.375
E2	7.3	7.4	7.5	0.286	0.292	0.294
E3	5.9	6.1	6.3	0.231	0.24	0.247
F		0.5			0.019	
G		1.2			0.047	
R1			0.25			0.01
R2		0.8			0.031	
T1		6 deg			6 deg	
T2		10 deg			10 deg	

Note: Resin protrusions not included (max value: 0.15 mm per side)

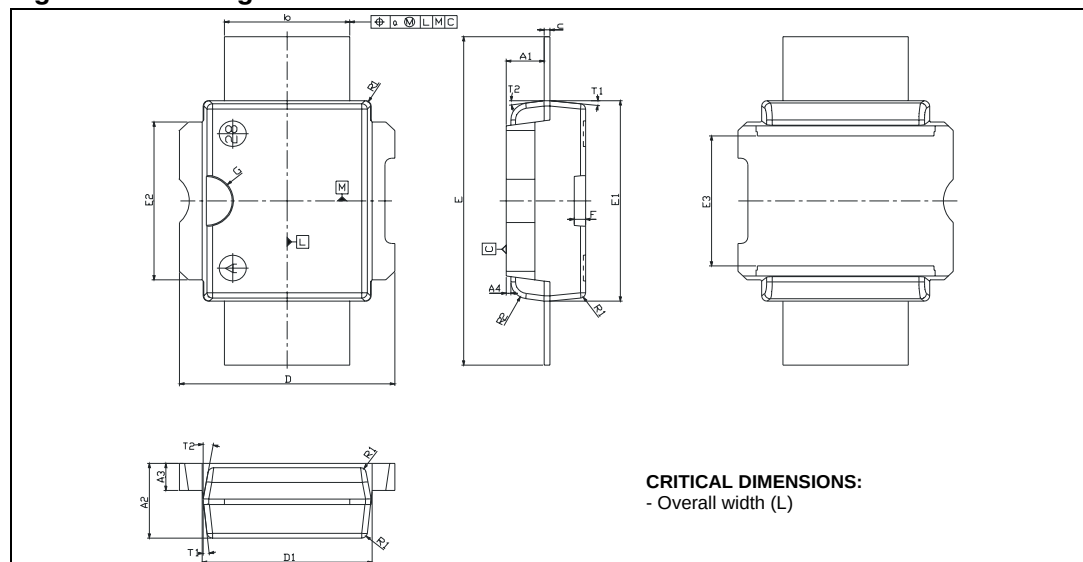
Figure 18. Package dimensions

Figure 19. Tube information

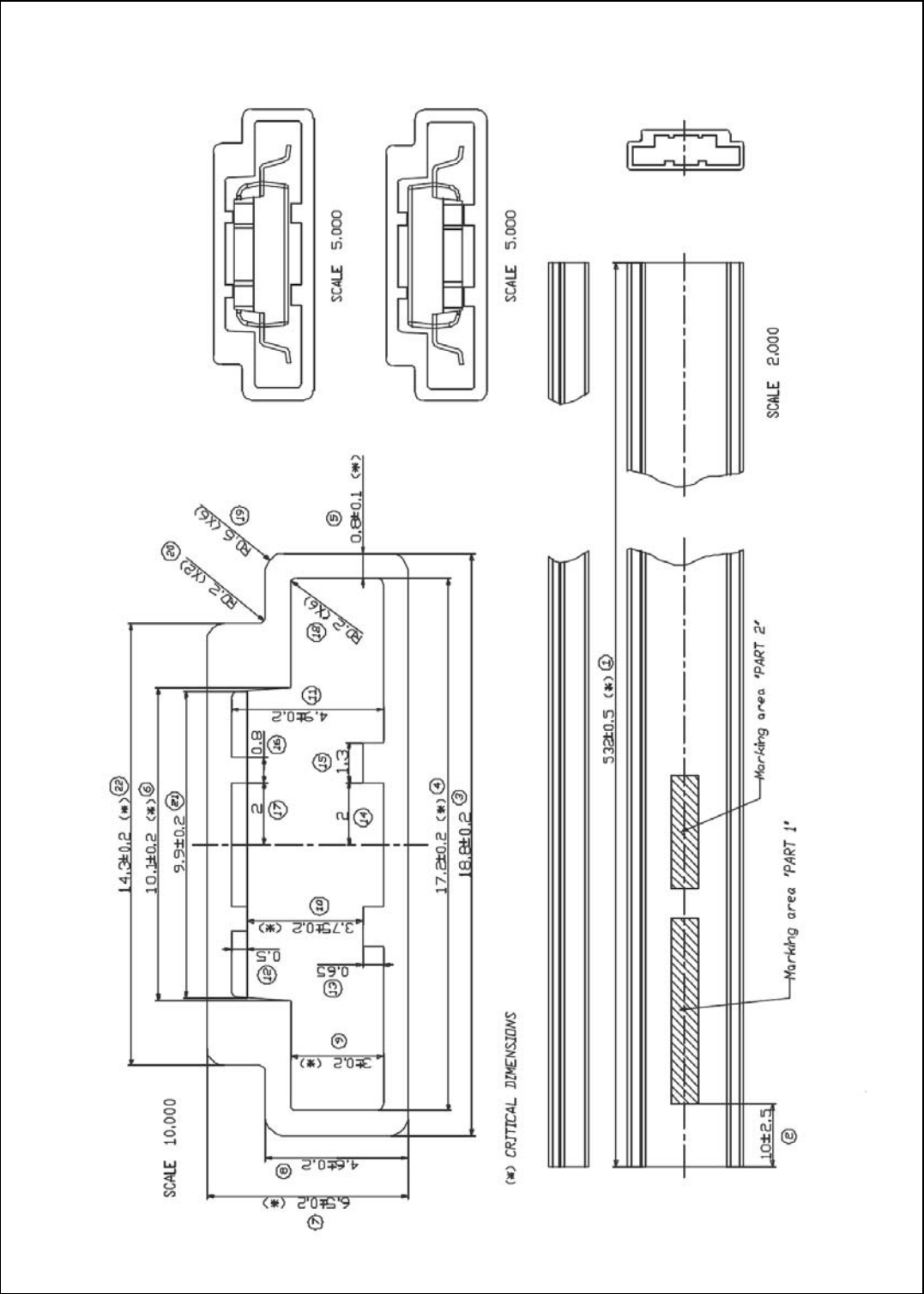
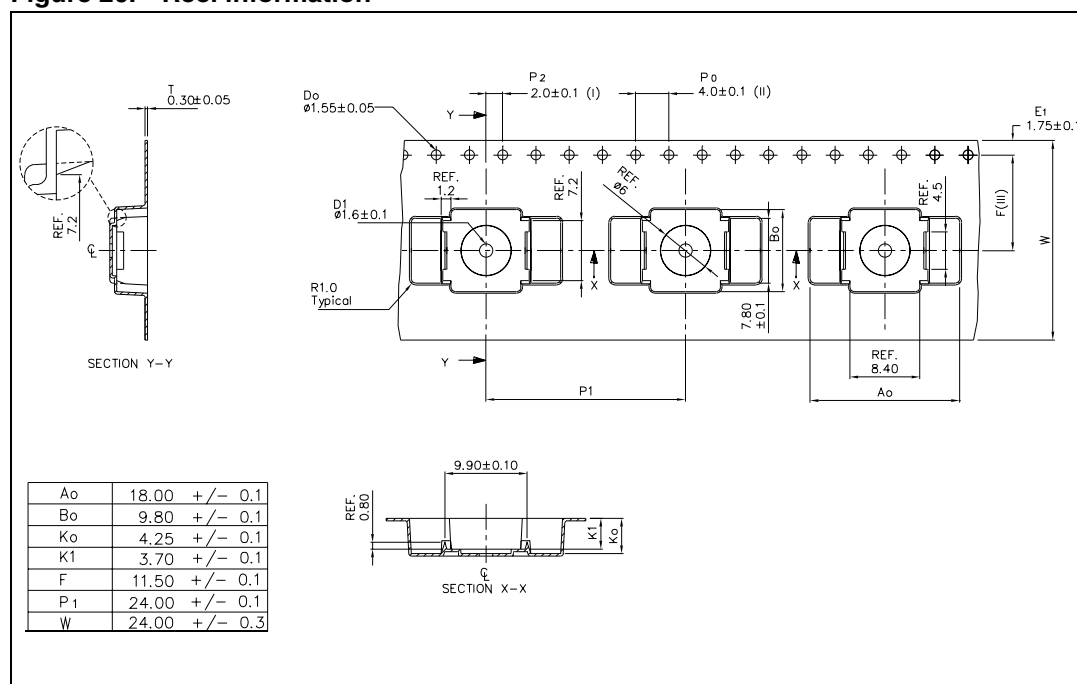


Figure 20. Reel information



7 Revision history

Table 9. Revision history

Date	Revision	Changes
07-Aug-2006	1	Initial 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.

© 2006 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