



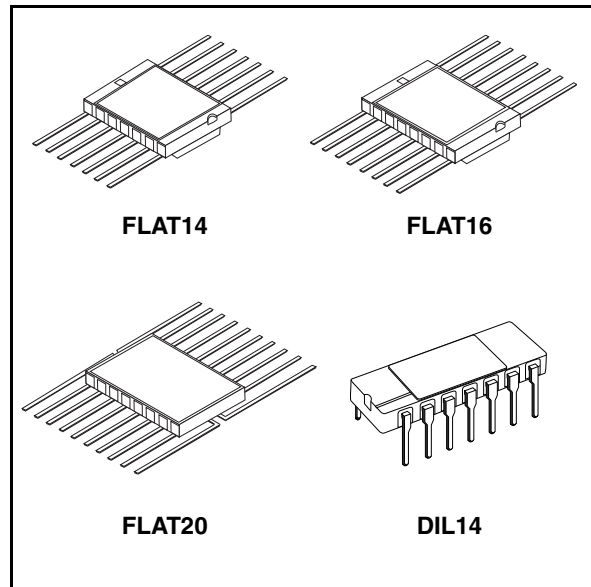
## RH-54AC/ACT series

### Advanced Rad-Hardened high speed CMOS 5V logic series

Data Brief

#### Features

- High speed  $T_{PD} = 4.5\text{ns typ}$
- Low power DC dissipation:  $8\mu\text{A max}$
- Symmetrical  $24\text{mA}$  outputs characteristics
- High noise immunity,  $28\%$  of min  $V_{CC}$
- Power down input protection
- Balanced propagation delays
- Improved electrical Latch-up immunity
- Controlled rise and fall times
- 2 to 6V operating voltage
- Available in hermetic Flat/DIL packages
- Available in DIE form upon request
- RadHard:  $300\text{kRad TID}$  at any Mil1019 dose rates
- SEL immune to  $110\text{MeV/cm}^2/\text{mg LET}$  ions
- Designed for Space use:  
RHA Qml-V DSCC Qualified
- Engineering model parts meet same electrical specifications as FM parts
- Detailed Type SMD shall be downloaded from DSCC web.site



#### Description

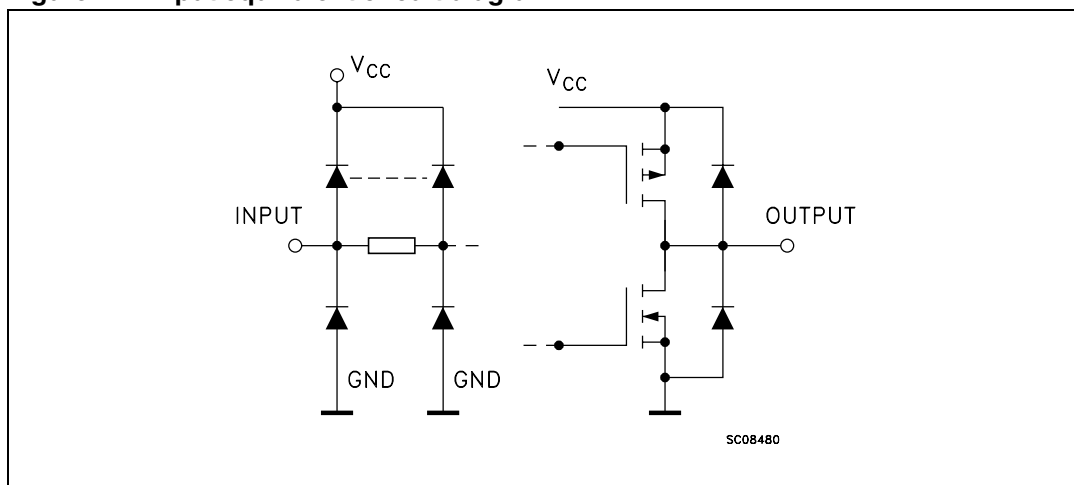
The RH-54AC/ACT series is an advanced RadHard submicron silicon gate CMOS family. It includes a large set of Gates, Flip-Flops, Multiplexers, Counters, Bus Interfaces and various other functions. RH-54AC/ACT radiation hardness and SEL-SEU immunity make this Logic Series usable in the most difficult environmental conditions.

# Contents

<b>1</b>	<b>Input equivalent circuit diagram</b> .....	<b>3</b>
<b>2</b>	<b>Maximum rating</b> .....	<b>4</b>
	2.1 Recommended operating conditions .....	4
<b>3</b>	<b>Package mechanical data</b> .....	<b>5</b>
<b>4</b>	<b>Type list</b> .....	<b>9</b>
<b>5</b>	<b>Revision history</b> .....	<b>11</b>

# 1 Input equivalent circuit diagram

Figure 1. Input equivalent circuit diagram



## 2 Maximum rating

Stressing the device above the rating listed in the “absolute maximum ratings” table may cause permanent damage to the device. These are stress ratings only and operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Refer also to the STMicroelectronics SURE program and other relevant quality documents.

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CC}$	Supply voltage	-0.5 to +7.0	V
$V_I$	DC input voltage	-0.5 to +7.0	V
$V_O$	DC output voltage	-0.5 to $V_{CC} + 0.5$	V
$I_{IK}$	DC input diode current	$\pm 20$	mA
$I_{OK}$	DC output diode current	$\pm 50$	mA
$I_O$	DC output current	$\pm 50$	mA
$I_{CC}$ or $I_{GND}$	DC $V_{CC}$ or ground current	$\pm 400$	mA
$T_{STG}$	Storage temperature	-65 to +150	°C
$T_L$	Lead temperature (10 sec)	260	°C

Note: All voltage values are referred to  $V_{SS}$  pin voltage.

### 2.1 Recommended operating conditions

**Table 2. Recommended operating conditions**

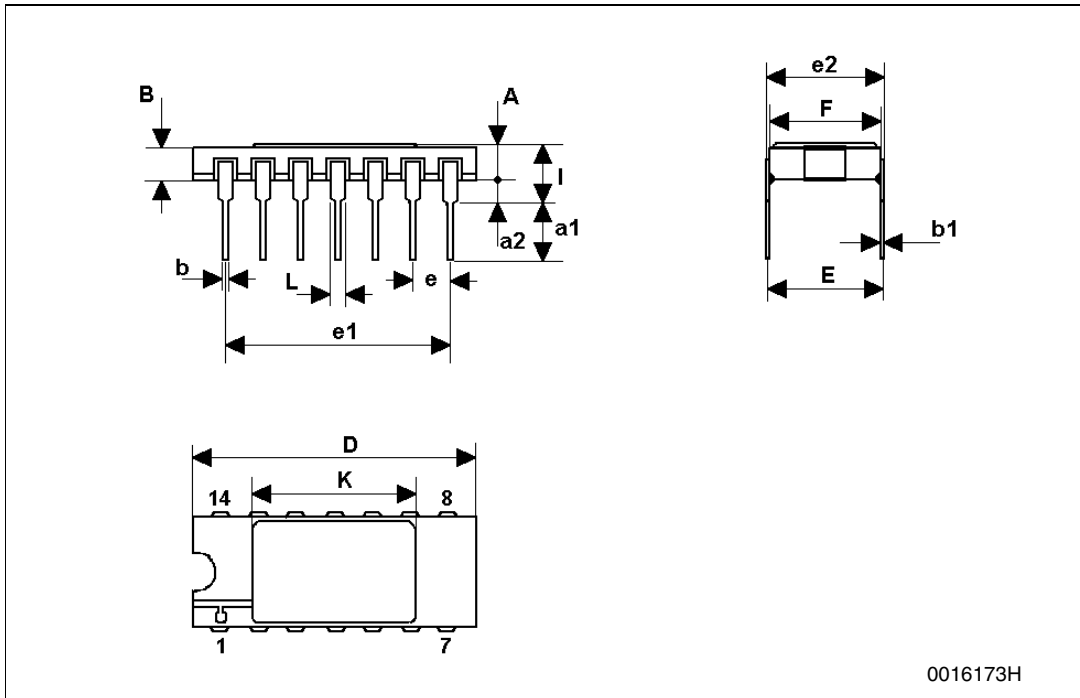
Symbols	Parameter	Value	Unit
$V_{CC}$	Supply voltage	2 to 6	V
$V_I$	Input voltage	0 to $V_{CC}$	V
$V_O$	Output voltage	0 to $V_{CC}$	V
$T_{OP}$	Operating temperature	-55 to 125	°C
dt/dv	Input rise and fall time <sup>(1)</sup> $V_{CC} = 3.0, 4.5$ or $5.5$	0 to 8	ns/V

1.  $V_{IN}$  from 30% to 70% of  $V_{CC}$

### 3 Package mechanical data

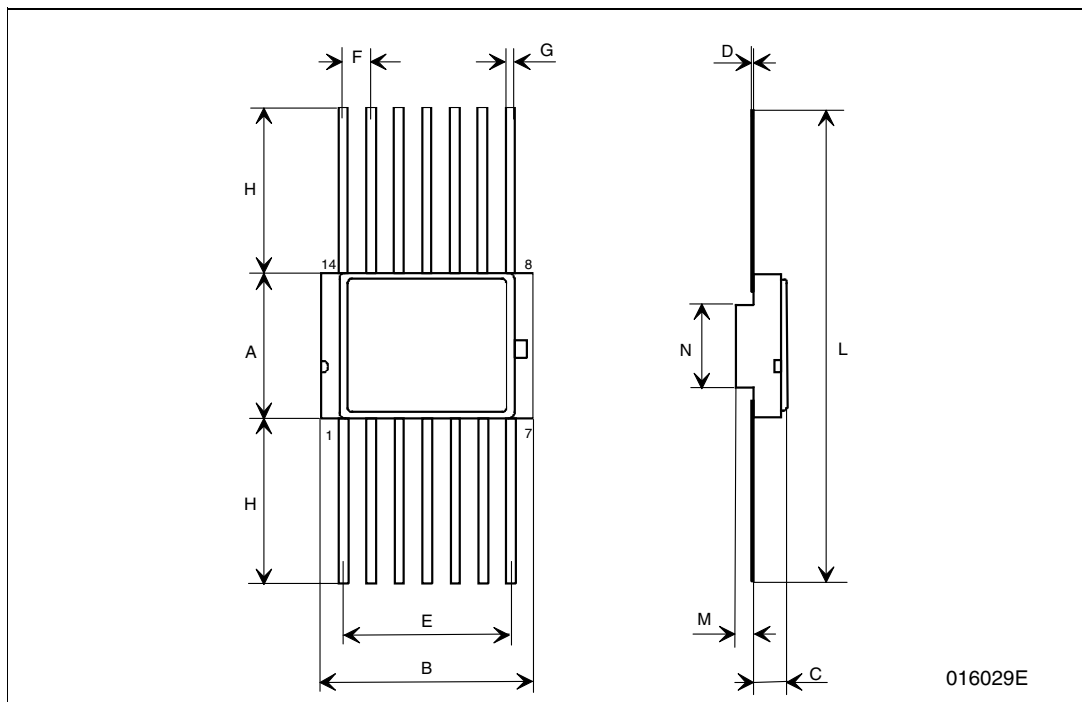
**DILC-14 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	2.1		2.54	0.083		0.100
a1	3.00		3.70	0.118		0.146
a2	0.63	0.88	1.14	0.025	0.035	0.045
B	1.82	2.03	2.39	0.072	0.080	0.094
b	0.40	0.45	0.50	0.016	0.018	0.020
b1	0.20	0.254	0.30	0.008	0.010	0.012
D	18.79	19.00	19.20	0.740	0.748	0.756
E	7.36	7.62	7.87	0.290	0.300	0.310
e		2.54			0.100	
e1	15.11	15.24	15.37	0.595	0.600	0.605
e2	7.62	7.87	8.12	0.300	0.310	0.320
F	7.11		7.75	0.280		0.305
l			3.70			0.146
K	10.90		12.1	0.429		0.476
L	1.14	1.27	1.5	0.045	0.050	0.059



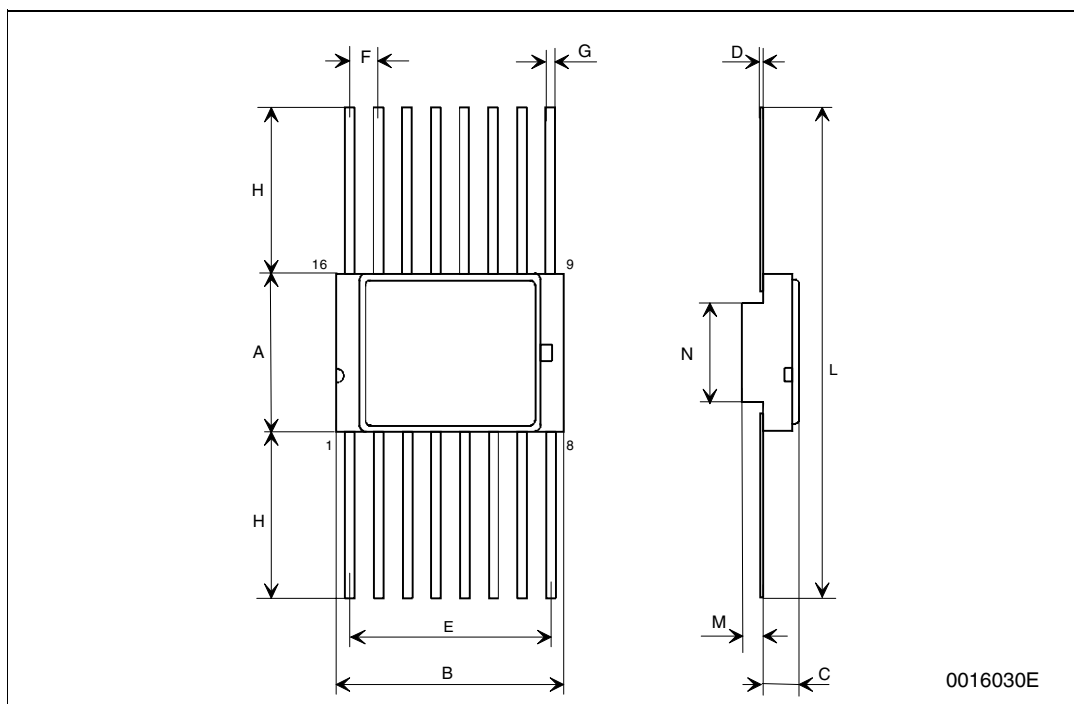
**FPC-14 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	6.75	6.91	7.06	0.266	0.272	0.278
B	9.76	9.95	10.14	0.384	0.392	0.399
C	1.49		1.95	0.059		0.077
D	0.10	0.127	0.15	0.004	0.005	0.006
E	7.50	7.62	7.75	0.295	0.300	0.305
F		1.27			0.050	
G	0.38	0.43	0.48	0.015	0.017	0.019
H		6.0			0.236	
L	18.75		22.0	0.738		0.866
M		0.38			0.015	
N		4.31			0.170	



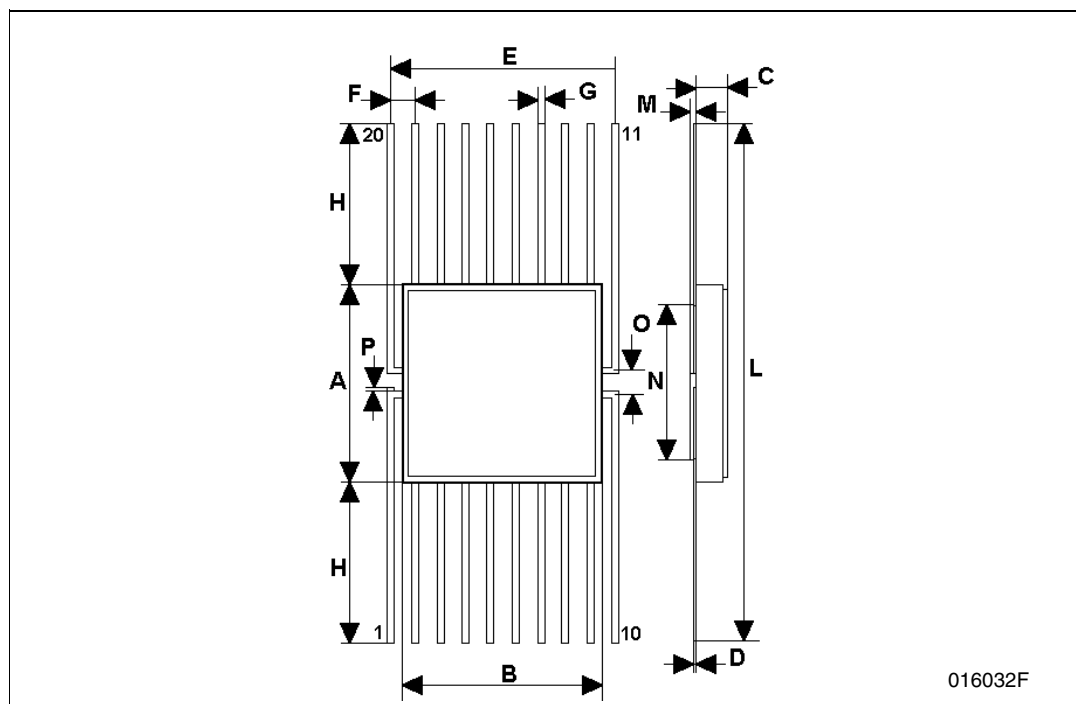
**FPC-16 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	6.75	6.91	7.06	0.266	0.272	0.278
B	9.76	9.94	10.14	0.384	0.392	0.399
C	1.49		1.95	0.059		0.077
D	0.102	0.127	0.152	0.004	0.005	0.006
E	8.76	8.89	9.01	0.345	0.350	0.355
F		1.27			0.050	
G	0.38	0.43	0.48	0.015	0.017	0.019
H	6.0			0.237		
L	18.75		22.0	0.738		0.867
M	0.33	0.38	0.43	0.013	0.015	0.017
N		4.31			0.170	



**FPC-20 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	9.98	10.16	10.34	0.393	0.400	0.407
B	9.98	10.16	10.34	0.393	0.400	0.407
C	1.45	1.61	1.78	0.57	0.63	0.070
D	0.10	0.127	0.18	0.004	0.005	0.007
E	11.30	11.43	11.56	0.445	0.450	0.455
F		1.27			0.050	
G	0.38	0.43	0.48	0.015	0.017	0.019
H	7.24		8.16	0.285		0.320
L	24.46		26.67	0.960		1.050
M	0.45	0.50	0.55	0.018	0.020	0.022
N		7.87			0.310	
O	1.14	1.27	1.40	0.045	0.050	0.055
P	0.10	0.18	0.25	0.004	0.007	0.010





## 4 Type list

**Table 3. Type list**

Types	DSCC Qml Smd number	Functionality	EM part number
RHFAC00	5962-87549	Quad 2-input NAND	RHFAC00K1
RHFAC02	5962-87612	Quad 2-input NOR	RHFAC02K1
RHFAC04	5962-87609	Hex Inverter	RHFAC04K1
RHFAC08	5962-89615	Quad 2-input AND	RHFAC08K1
RHFAC10	5962-87610	Triple 3-input NAND	RHFAC10K1
RHFAC11	5962-87611	Triple 3-input AND	RHFAC11K1
RHFAC14	5962-87624	Hex Schmitt Inverter	RHFAC14K1
RHFAC32	5962-87614	Quad 2-input OR	RHFAC32K1
RHFAC74	5962-88520	Dual D-type FF + preset+clear	RHFAC74K1
RHFAC86	5962-89550	Quad exclusive OR	RHFAC86K1
RHFAC138	5962-87622	3-to-8 Line Decoder inverter	RHFAC138K1
RHFAC139	5962-87623	Dual 2-to-4 line Decoder demux	RHFAC139K1
RHFAC151	5962-87691	8-channel Multiplexer	RHFAC151K1
RHFAC157	5962-89539	Quad 2-channel Multiplexer	RHFAC157K1
RHFAC161	5962-89561	Synchr Binary Counter +Asyn Clear	RHFAC161K1
RHFAC174	5962-87626	Hex D-Type Flip Flop with Clear	RHFAC174K1
RHFAC191	5962-89749	4bit Synchr. Binary up-down Counter	RHFAC191K1
RHFAC240	5962-89550	Octal Bus Buffer - 3-state/Inverter	RHFAC240K1
RHFAC244	5962-87552	Octal Bus Buffer - 3-state	RHFAC244K1
RHFAC245	5962-87758	Octal Bus Transceiver - 3-state	RHFAC245K1
RHFAC273	5962-87756	Octal D-Flip-Flop with Clear	RHFAC273K1
RHFAC373	5962-87555	Octal D-type Latch -3-state	RHFAC373K1
RHFAC374	5962-87694	Octal D-type Flip Flop -3-state	RHFAC374K1
RHFAC541	5962-88706	Octal Bus Buffer - 3-state	RHFAC541K1
RHFAC574	5962-96773	Octal D-type Flip Flop -3-state	RHFAC574K1
RHFAC16244	5962-04210	16 Line Bus Buffer -3-state	RHFAC16244K1
RHFAC16245	5962-04211	16 Line Bus Buffer -3-state	RHFAC16245K1
RHFAC16373	5962-04212	16 D-type Latch -3-state	RHFAC16373K1
RHFAC16374	5962-04213	16 D-type Flip Flop, 3-state	RHFAC16374K1

Table 3. Type list

Types	DSCC Qml Smd number	Functionality	EM part number
RHFACT00	5962-87699	Quad 2-input NAND	RHFACT00K1
RHFACT02	5962-89791	Quad 2-input NOR	RHFACT02K1
RHFACT04	5962-89734	Hex Inverter	RHFACT04K1
RHFACT08	5962-89547	Quad 2-input AND	RHFACT08K1
RHFACT10	5962-92182	Triple 3-input NAND	RHFACT10K1
RHFACT11	5962-90772	Triple 3-input AND	RHFACT11K1
RHFACT14	5962-96813	Hex Schmitt Inverter	RHFACT14K1
RHFACT32	5962-89736	Quad 2-input OR	RHFACT32K1
RHFACT74	5962-87525	Dual D-type FF + preset+clear	RHFACT74K1
RHFACT86	5962-90687	Quad exclusive OR	RHFACT86K1
RHFACT138	5962-87554	3-to-8 Line Decoder inverter	RHFACT138K1
RHFACT139	5962-87553	Dual 2-to-4 line Decoder demux	RHFACT139K1
RHFACT151	5962-88756	8-channel Multiplexer	RHFACT151K1
RHFACT157	5962-89688	Quad 2-channel Multiplexer	RHFACT157K1
RHFACT161	5962-91722	Synchr Binary Counter +Asyn Clear	RHFACT161K1
RHFACT174	5962-87757	Hex D-Type Flip Flop with Clear	RHFACT174K1
RHFACT191	5962-04228	4bit Synchr. Binary up-down Counter	RHFACT191K1
RHFACT240	5962-87759	Octal Bus Buffer - 3-state/Inverter	RHFACT240K1
RHFACT244	5962-87760	Octal Bus Buffer - 3-state	RHFACT244K1
RHFACT245	5962-87663	Octal Bus Transceiver - 3-state	RHFACT245K1
RHFACT273	5962-01527	Octal D-Flip-Flop with Clear	RHFACT273K1
RHFACT373	5962-87556	Octal D-type Latch -3-state	RHFACT373K1
RHFACT374	5962-87631	Octal D-type Flip Flop -3-state	RHFACT374K1
RHFACT541	5962-89795	Octal Bus Buffer - 3-state	RHFACT541K1
RHFACT574	5962-89601	Octal D-type Flip Flop -3-state	RHFACT574K1
RHFACT16244	5962-92022	16 Line Bus Buffer -3-state	RHFACT16244K1
RHFACT16245	5962-92023	16 Line Bus Buffer -3-state	RHFACT16245K1
RHFACT16373	5962-92024	16 D-type Latch -3-state	RHFACT16373K1
RHFACT16374	5962-92025	16 D-type Flip Flop, 3-state	RHFACT16374K1
RHFACTQ04	5962-89734	Hex Inverter	RHFACTQ04K1

## 5 Revision history

**Table 4. Revision history**

Date	Revision	Changes
18-Oct-2006	1	First release
10-May-2007	2	Typo in <a href="#">Table 3: Type list on page 9</a>

**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](http://www.st.com)