Features

- No External Components Except PIN Diode
- Supply-voltage Range: 4.5V to 5.5V
- Highest Sensitivity Due to Automatic Sensitivity Adaption (AGC) and Automatic Strong Signal Adaption (ATC)
- Highest Immunity Against Disturbances from Daylight and Lamps
- Available for Carrier Frequencies between 30 kHz to 76 kHz; Adjusted by Zener Diode Fusing
- TTL and CMOS Compatible
- Suitable Minimum Burst Length \geq 10 Pulses/Burst

Applications

- Home Entertainment Applications (Audio/Video)
- Home Appliances
- Remote Control Equipment

1. Description

The IC T2525 is a complete IR receiver for data communication that was developed and optimized for use in carrier-frequency-modulated transmission applications. The IC offers highest sensitivity as well as highest suppression of noise from daylight and lamps. The T2525 is available with broadest range of carrier frequencies (30, 33, 36, 37, 38, 40, 44, 56, 76 kHz) and 5 different noise suppression regulation types (standard, lamp, noise, short burst, data rate) covering requirements of high-end remote control solutions (please refer to selection guide available for T2525/ATA2526). The T2525 operates in a supply voltage range of 4.5V to 5.5V.

The function of T2525 can be described using the block diagram (see Figure 1-1 on page 2). The input stage meets two main functions. First, it provides a suitable bias voltage for the PIN diode. Secondly, the pulsed photo-current signals are transformed into a voltage by a special circuit which is optimized for low-noise applications. After amplification by a Controlled Gain Amplifier (CGA), the signals have to pass a tuned integrated narrow bandpass filter with a center frequency f_0 which is equivalent to the chosen carrier frequency of the input signal. The demodulator is used to convert the input burst signal into a digital envelope output pulse and to evaluate the signal information quality, i.e., unwanted pulses will be suppressed at the output pin. All this is done by means of an integrated dynamic feedback circuit which varies the gain as a function of the present environmental condition (ambient light, modulated lamps etc.). Other special features are used to adapt to the current application to secure best transmission quality.



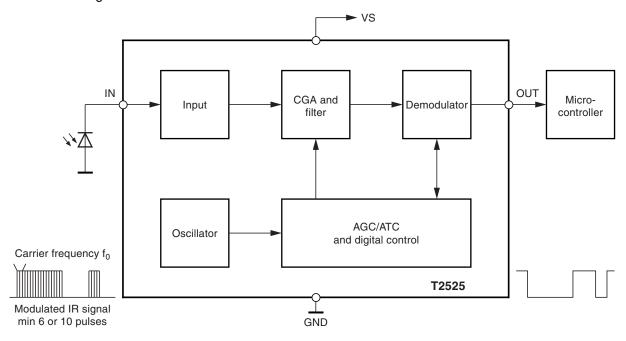
IR Receiver ASSP

T2525





Figure 1-1. Block Diagram



2. Pin Configuration

Figure 2-1. Pinning SO8 and TSSOP8

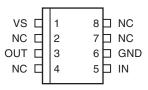


Table 2-1.Pin Description

Pin	Symbol	Function		
1	VS	Supply voltage		
2	NC	Not connected		
3	OUT	Data output		
4	NC	Not connected		
5	IN	nput PIN diode		
6	GND	Ground		
7	NC	Not connected		
8	NC	Not connected		

3. Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

	_		-
Parameters	Symbol	Value	Unit
Supply voltage	V _S	−0.3 to +6	V
Supply current	I _S	3	mA
Input voltage	V _{IN}	–0.3 to V _S	V
Input DC current at V _S = 5V	I _{IN}	0.75	mA
Output voltage	Vo	–0.3 to V _S	V
Output current	I _O	10	mA
Operating temperature	T _{amb}	-25 to +85	°C
Storage temperature	T _{stg}	-40 to +125	°C
Power dissipation at T _{amb} = 25°C	P _{tot}	30	mW

4. Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient SO8	R _{thJA}	130	K/W
Junction ambient TSSOP8	R _{thJA}	150	K/W





5. Electrical Characteristics

 $T_{amb} = 25$ °C, $V_{S} = 5V$ unless otherwise specified.

No.	Parameters Test Conditions		Pin	Symbol	Min.	Тур.	Max.	Unit	Type*
1	Supply								
1.1	Supply-voltage range		1	V _S	4.5	5	5.5	V	С
1.2	Supply current	$I_{IN} = 0$	1	I _S	0.8	1.1	1.4	mA	В
2	Output								
2.1	Internal pull-up resistor ⁽¹⁾	T _{amb} = 25°C; see Figure 6-7 on page 8	1,3	R _{PU}		30/40		kΩ	А
2.2	Output voltage low	I _L = 2 mA; see Figure 6-7 on page 8	3,6	V _{OL}			250	mV	В
2.3	Output voltage high		3,1	V _{OH}	V _S - 0.25		Vs	V	В
2.4	Output current clamping	R ₂ = 0; see Figure 6-7 on page 8	3,6	I _{OCL}		8		mA	В
3	Input								
3.1	Input DC current	V _{IN} = 0; see Figure 6-7 on page 8	5	I _{IN_DCMAX}	-85			μΑ	С
3.2	Input DC current; Figure 6-2 on page 6	$V_{IN} = 0$; $V_s = 5V$, $T_{amb} = 25$ °C	5	I _{IN_DCMAX}	-530	-960		μΑ	В
3.3	Minimum detection threshold current; Figure 6-1 on page 6	Test signal: see Figure 6-6 on page 8 $V_S = 5V$, $T_{amb} = 25^{\circ}C$, $I_{IN_DC} = 1 \mu A$; square pp, burst N = 16, $f = f_0$; $t_{PER} = 10 \text{ ms}$, Figure 6-6 on page 8; BER = $50^{(2)}$	3	I _{Eemin}		-500		pA	В
3.4	Minimum detection threshold current with AC current disturbance IIN_AC100 = 3 μA at 100 Hz	Test signal: see Figure 6-6 on page 8 $V_S = 5V$, $T_{amb} = 25^{\circ}C$, $I_{IN_DC} = 1 \mu A$, square pp, burst N = 16, $f = f_0$; $t_{PER} = 10 ms$, Figure 6-6 on page 8; BER = $50\%^{(2)}$	3	I _{Eemin}		-750		рА	С

^{*)} Type means: A =100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Notes: 1. Depending on version, see "Ordering Information"

^{2.} BER = Bit Error Rate; e.g., BER = 5% means that with P = 20 at the input pin 19...21 pulses can appear at the pin OUT

^{3.} After transformation of input current into voltage

5. Electrical Characteristics (Continued)

 $T_{amb} = 25$ °C, $V_S = 5V$ unless otherwise specified.

Parameters	Test Conditions	Pin	Symbol	Min.	Тур.	Max.	Unit	Type*
Maximum detection threshold current with V_{IN} > 0V	Test signal: see Figure 6-6 on page 8 $V_S = 5$ V, $T_{amb} = 25$ °C, $I_{IN_DC} = 1$ μ A; square pp, burst N = 16, $f = f_0$; $t_{PER} = 10$ ms, Figure 6-6 on page 8; BER = $5\%^{(2)}$	3	I _{Eemax}	-400			μА	D
4 Controlled Amplifier and Filter								
Maximum value of variable gain (CGA)			G _{VARMAX}		51		dB	D
Minimum value of variable gain (CGA)			G _{VARMIN}		-5		dB	D
Total internal amplification ⁽³⁾			G _{MAX}		71		dB	D
Center frequency fusing accuracy of bandpass	$V_S = 5V$, $T_{amb} = 25$ °C		f _{0_FUSE}	-3	f ₀	+3	%	Α
Overall accuracy center frequency of bandpass			f ₀	-6.7	f ₀	+4.1	%	С
BPF bandwidth: type N0 - N3	-3 dB; $f_0 = 38$ kHz; see Figure 6-4 on page 7		В		3.5		kHz	С
BPF bandwidth: type N6, N7	-3 dB; $f_0 = 38$ kHz Figure 6-4 on page 7		В		5.4		kHz	С
	threshold current with $V_{IN} > 0V$ Controlled Amplifier ar Maximum value of variable gain (CGA) Minimum value of variable gain (CGA) Total internal amplification ⁽³⁾ Center frequency fusing accuracy of bandpass Overall accuracy center frequency of bandpass BPF bandwidth: type N0 - N3 BPF bandwidth:	$eq:see_see_see_see_see_see_see_see_see_see$	Maximum detection threshold current with $V_{\text{IN}} > 0V$ $\frac{1}{N_{\text{DC}}} = 1 \mu\text{A};$ square pp, burst N = 16, f = f_0; t_{\text{PER}} = 10 \text{ms}, Figure 6-6 on page 8; BER = $5\%^{(2)}$ $\frac{1}{N_{\text{DC}}} = 10 \text{ms}$, Figure 6-6 on page 8; BER = $\frac{10}{N_{\text{BER}}} = 10 \text{ms}$, Figure 6-6 on page 8; BER = $\frac{10}{N_{\text{BER}}} = 10 \text{ms}$, Figure 6-6 on page 8; BER = $\frac{10}{N_{\text{BER}}} = \frac{10}{N_{\text{BER}}} = \frac{10}{N_{B$	$\begin{array}{c} \text{Maximum detection} \\ \text{threshold current with} \\ \text{V}_{\text{IN}} > \text{OV} \\ \end{array} \begin{array}{c} \text{see Figure 6-6 on page 8} \\ \text{V}_{\text{S}} = 5 \text{ V, T}_{\text{amb}} = 25^{\circ}\text{C,} \\ \text{I}_{\text{IN}_{\text{DC}}} = 1 \mu\text{A;} \\ \text{square pp,} \\ \text{burst N} = 16, \\ \text{f} = f_0; \text{t}_{\text{PER}} = 10 \text{ms,} \\ \text{Figure 6-6 on page 8;} \\ \text{BER} = 5\%^{(2)} \\ \end{array} \\ \begin{array}{c} \text{Controlled Amplifier and Filter} \\ \text{Maximum value of} \\ \text{variable gain (CGA)} \\ \text{Minimum value of} \\ \text{variable gain (CGA)} \\ \end{array} \begin{array}{c} \text{G}_{\text{VARMAX}} \\ \text{Givariable gain (CGA)} \\ \text{Total internal} \\ \text{amplification}^{(3)} \\ \text{Center frequency fusing accuracy of bandpass} \\ \text{Overall accuracy center} \\ \text{frequencyofbandpass} \\ \text{Overall accuracy center frequency of bandpass} \\ \text{BPF bandwidth:} \\ \text{type N0 - N3} \\ \text{BPF bandwidth:} \\ \text{-3 dB; f}_0 = 38 \text{kHz; see} \\ \text{Figure 6-4 on page 7} \\ \text{B} \\ \text{BPF bandwidth:} \\ \text{-3 dB; f}_0 = 38 \text{kHz} \\ \text{B} \\ \end{array} $	Maximum detection threshold current with $V_{IN} > 0V$ $\frac{1}{N_{IN}} = 25^{\circ}C$, $\frac{1}{N_{IN}} $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} \text{Maximum detection} \\ \text{Maximum detection} \\ \text{threshold current with} \\ V_{\text{IN}} > \text{OV} \end{array} \begin{array}{c} \text{See Figure 6-6 on page 8} \\ V_{\text{S}} = 5 \text{ V, } T_{\text{amb}} = 25^{\circ}\text{C,} \\ I_{\text{IN_DC}} = 1 \mu\text{A;} \\ \text{square pp,} \\ \text{burst N} = 16, \\ f = f_0; f_{\text{per}} = 10 \text{ms,} \\ \text{Figure 6-6 on page 8;} \\ \text{BER} = 5\%^{(2)} \end{array} \\ \begin{array}{c} \text{Controlled Amplifier and Filter} \\ \text{Maximum value of} \\ \text{variable gain (CGA)} \end{array} \begin{array}{c} \text{G}_{\text{VARMAX}} \end{array} \begin{array}{c} 51 \\ \text{S1} \\ \text{Minimum value of} \\ \text{variable gain (CGA)} \end{array} \\ \begin{array}{c} \text{Minimum value of} \\ \text{variable gain (CGA)} \end{array} \begin{array}{c} \text{G}_{\text{VARMIN}} \end{array} \begin{array}{c} \text{-5} \\ \text{-5} \\ \text{Total internal} \\ \text{amplification}^{(3)} \end{array} \\ \begin{array}{c} \text{Center frequency fusing} \\ \text{accuracy of bandpass} \end{array} \begin{array}{c} \text{V}_{\text{S}} = 5\text{V, } T_{\text{amb}} = 25^{\circ}\text{C} \end{array} \begin{array}{c} \text{f}_{0_\text{FUSE}} \end{array} \begin{array}{c} \text{-3} f_{0} \\ \text{+3} \\ \text{Overall accuracy center} \\ \text{frequencyofbandpass} \end{array} \begin{array}{c} \text{-3 dB; } f_{0} = 38 \text{kHz; see} \\ \text{Figure 6-4 on page 7} \end{array} \begin{array}{c} \text{B} \\ \text{BPF bandwidth:} \\ \text{-3 dB; } f_{0} = 38 \text{kHz} \end{array} \end{array} \begin{array}{c} \text{-3 dB; } f_{0} = 38 \text{kHz} \end{array} $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

^{*)} Type means: A =100% tested, B = 100% correlation tested, C = Characterized on samples, D = Design parameter

Notes: 1. Depending on version, see "Ordering Information"

- 2. BER = Bit Error Rate; e.g., BER = 5% means that with P = 20 at the input pin 19...21 pulses can appear at the pin OUT
- 3. After transformation of input current into voltage

5.1 **ESD**

All pins ⇒2000V HBM; 200V MM, MIL-STD-883C, Method 3015.7

5.2 Reliability

Electrical qualification (1000h) in molded SO8 plastic package





6. Typical Electrical Curves at $T_{amb} = 25^{\circ}C$

Figure 6-1. I_{Eemin} versus I_{IN_DC} , $V_S = 5V$

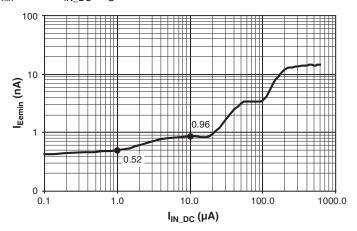


Figure 6-2. V_{IN} versus I_{IN_DC} , $V_S = 5V$

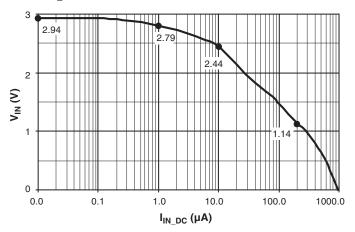


Figure 6-3. Data Transmission Rate, $V_S = 5V$

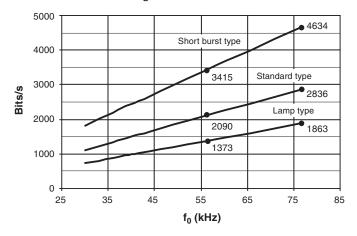
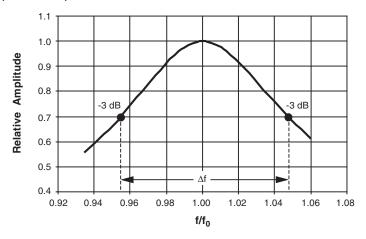
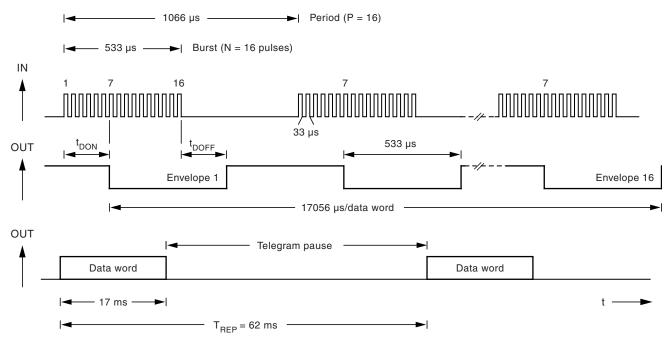


Figure 6-4. Typical Bandpass Curve



 $Q = f_0/\Delta f$; $\Delta f = -3$ dB values. Example: Q = 1/(1.047 - 0.954) = 11

Figure 6-5. Illustration of Used Terms



Example: f = 30 kHz, burst with 16 pulses, 16 periods



Figure 6-6. Test Circuit

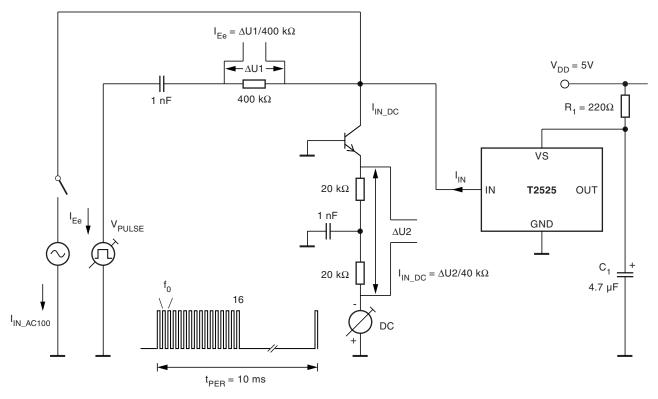
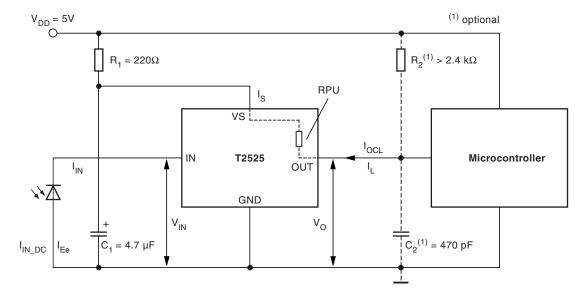
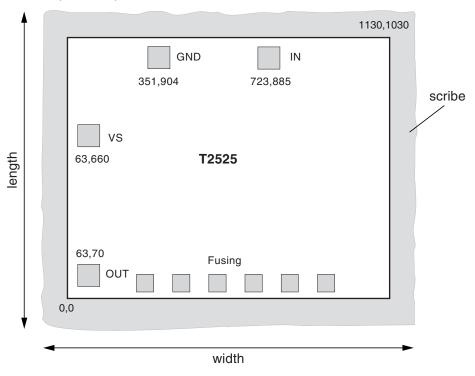


Figure 6-7. Application Circuit



7. Chip Dimensions

Figure 7-1. Chip Size in μm



Note: Pad coordinates are for lower left corner of the pad in μm from the origin 0,0

Dimensions	Length inclusive scribe	1.15 mm	
	Width inclusive scribe	1.29 mm	
	Thickness	290μ ± 5%	
	Pads	$90\mu\times90\mu$	
	Fusing pads	$70\mu \times70\mu$	
Pad metallurgy	Material	AlCu/AlSiTi ⁽¹⁾	
	Thickness	0.8 µm	
Finish	Material	Si ₃ N ₄ /SiO ₂	
	Thickness	0.7/0.3 μm	

Note: Value depends on manufacture location.





8. Ordering Information

Delivering: unsawn wafers (DDW) in box.

Extended Type Number	PL ⁽²⁾	R _{PU} ⁽³⁾	D ⁽⁴⁾	Type ⁽⁵⁾
T2525S0xx ⁽¹⁾ C-DDW	2	30	2090	Standard type: ≥ 10 pulses, enhanced sensibility, high data rate
T2525S1xx ⁽¹⁾ C-DDW	1	30	2090	Standard type: ≥ 10 pulses, enhanced sensibility, high data rate
T2525S2xx ⁽¹⁾ C-DDW	2	40	1373	Lamp type: ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
T2525S3xx ⁽¹⁾ C-DDW	1	40	1373	Lamp type: ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
T2525S6xx ⁽¹⁾ C-DDW	2	30	3415	Short burst type: ≥ 6 pulses, enhanced data rate
T2525S7xx ⁽¹⁾ C-DDW	1	30	3415	Short burst type: ≥ 6 pulses, enhanced data rate

Notes: 1. xx means the used carrier frequency value f₀ 30, 33, 36, 38, 40, 44, 56 kHz. (76 kHz type on request)

- 2. Two pad layout versions (see Figure 9-1 and Figure 9-2) available for different assembly demand
- 3. Integrated pull-up resistor at pin OUT (see "Electrical Characteristics")
- 4. Typical data transmission rate up to bit/s with $f_0 = 56$ kHz, $V_S = 5V$ (see Figure 6-3 on page 6)
- 5. On request: noise type, data rate type

9. Pad Layout

Figure 9-1. Pad Layout 1

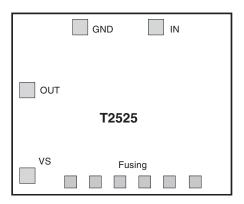
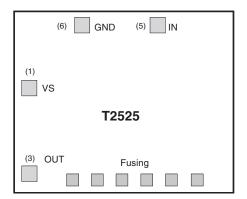


Figure 9-2. Pad Layout 2



10. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

Revision No.	History				
4657G-AUTO-09/09	Put datasheet in newest template				
4057 G-A010-09/09	Ordering Information table changed				
	Features on page 1 changed				
	Applications on page 1 changed				
	Section 1 "Description" on page 1 changed				
4657F-AUTO-10/06	 Section 5 "Electrical Characteristics" number 3.3 and 3.4 on page 4 changed 				
	Section 8 "Ordering Information" on page 10 changed				
	Section 9 "Pad Layout" on page 10 changed				
4657E-AUTO-04/06	Put datasheet in a new template				
4037 E-A010-04/00	Section 8 "Ordering Information" on page 10 changed				





Headquarters

Atmel Corporation

2325 Orchard Parkway San Jose, CA 95131

USA

Tel: 1(408) 441-0311 Fax: 1(408) 487-2600

International

Atmel Asia

Unit 1-5 & 16, 19/F BEA Tower, Millennium City 5 418 Kwun Tong Road Kwun Tong, Kowloon Hong Kong

Tel: (852) 2245-6100

Fax: (852) 2722-1369

Atmel Europe

Le Krebs 8, Rue Jean-Pierre Timbaud

BP 309 78054

Saint-Quentin-en-Yvelines Cedex

France

Tel: (33) 1-30-60-70-00 Fax: (33) 1-30-60-71-11

Atmel Japan

9F, Tonetsu Shinkawa Bldg. 1-24-8 Shinkawa

Chuo-ku, Tokyo 104-0033

Japan

Tel: (81) 3-3523-3551 Fax: (81) 3-3523-7581

Product Contact

Web Site

www.atmel.com

Technical Support

ir_control@atmel.com

Sales Contact

www.atmel.com/contacts

Literature Requests

www.atmel.com/literature

Disclaimer: The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. EXCEPT AS SET FORTH IN ATMEL'S TERMS AND CONDITIONS OF SALE LOCATED ON ATMEL'S WEB SITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel's products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

© 2009 Atmel Corporation. All rights reserved. Atmel[®], logo and combinations thereof, and others are registered trademarks or trademarks of Atmel Corporation or its subsidiaries. Other terms and product names may be trademarks of others.