

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 56 kHz; Adjusted by Zener Diode Fusing
- TTL and CMOS Compatible
- Suitable Minimum Burst Length ≥ 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 kHz) and 3 different noise suppression regulation types (standard, lamp, short burst) covering requirements of high-end remote control solutions (please refer to selection guide available for T2525/T2526). The T2525 operates in a supply voltage range of 4.5V to 5.5V.

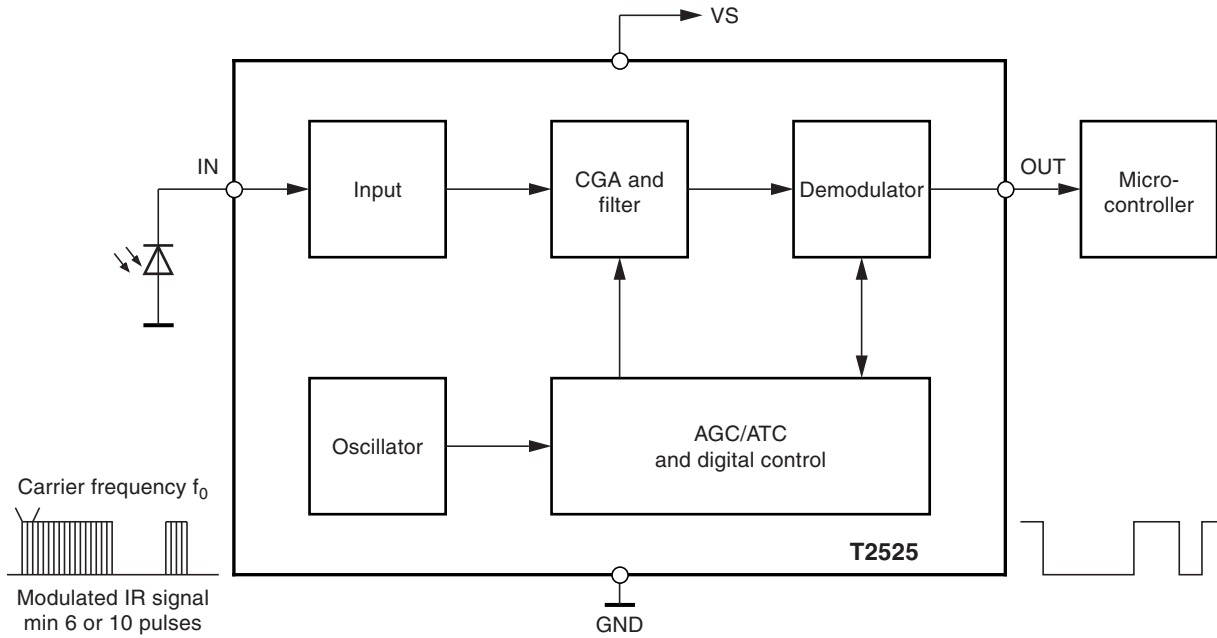
The function of T2525 can be described using the block diagram (see [Figure 1-1 on page 2](#)). The input stage meets two main functions. First, it provides a suitable bias voltage for the PIN diode. Secondly, the pulsed photo-current signals are transformed into a voltage by a special circuit which 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 Description

Table 2-1. Pin Description

Symbol	Function
VS	Supply voltage
OUT	Data output
IN	Input PIN diode
GND	Ground

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	V_O	-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 $T_{amb} = 25^\circ C$	P_{tot}	30	mW

4. Electrical Characteristics

$T_{amb} = 25^{\circ}\text{C}$, $V_S = 5\text{V}$ unless otherwise specified.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
1	Supply							
1.1	Supply-voltage range		V_S	4.5	5	5.5	V	C
1.2	Supply current	$I_{IN} = 0$	I_S	0.8	1.1	1.4	mA	B
2	Output							
2.1	Internal pull-up resistor ⁽¹⁾	$T_{amb} = 25^{\circ}\text{C}$; see Figure 5-7 on page 8	R_{PU}		30/40		k Ω	A
2.2	Output voltage low	$I_L = 2\text{ mA}$; see Figure 5-7 on page 8	V_{OL}			250	mV	B
2.3	Output voltage high		V_{OH}	$V_S - 0.25$		V_S	V	B
2.4	Output current clamping	$R_2 = 0$; see Figure 5-7 on page 8	I_{OCL}		8		mA	B
3	Input							
3.1	Input DC current	$V_{IN} = 0$; see Figure 5-7 on page 8	I_{IN_DCMAX}	-85			μA	C
3.2	Input DC current; Figure 5-2 on page 6	$V_{IN} = 0$; $V_S = 5\text{V}$, $T_{amb} = 25^{\circ}\text{C}$	I_{IN_DCMAX}	-530	-960		μA	B
3.3	Minimum detection threshold current; Figure 5-1 on page 6	Test signal: see Figure 5-6 on page 8 $V_S = 5\text{V}$, $T_{amb} = 25^{\circ}\text{C}$, $I_{IN_DC} = 1\ \mu\text{A}$; square pp, burst $N = 16$, $f = f_0$; $t_{PER} = 10\text{ ms}$, Figure 5-6 on page 8 ; $\text{BER} = 50^{(2)}$	I_{Eemin}		-500		pA	B
3.4	Minimum detection threshold current with AC current disturbance $I_{IN_AC100} = 3\ \mu\text{A}$ at 100 Hz	Test signal: see Figure 5-6 on page 8 $V_S = 5\text{V}$, $T_{amb} = 25^{\circ}\text{C}$, $I_{IN_DC} = 1\ \mu\text{A}$, square pp, burst $N = 16$, $f = f_0$; $t_{PER} = 10\text{ ms}$, Figure 5-6 on page 8 ; $\text{BER} = 50\%^{(2)}$	I_{Eemin}		-750		pA	C

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

- Notes:
- Depending on version, see "Ordering Information"
 - 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
 - After transformation of input current into voltage

4. Electrical Characteristics (Continued)

$T_{amb} = 25^{\circ}\text{C}$, $V_S = 5\text{V}$ unless otherwise specified.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
3.5	Maximum detection threshold current with $V_{IN} > 0\text{V}$	Test signal: see Figure 5-6 on page 8 $V_S = 5\text{V}$, $T_{amb} = 25^{\circ}\text{C}$, $I_{IN_DC} = 1\ \mu\text{A}$; square pp, burst N = 16, $f = f_0$; $t_{PER} = 10\text{ ms}$, Figure 5-6 on page 8 ; BER = 5% ⁽²⁾	I_{Eemax}	-400			μA	D
4	Controlled Amplifier and Filter							
4.1	Maximum value of variable gain (CGA)		G_{VARMAX}		51		dB	D
4.2	Minimum value of variable gain (CGA)		G_{VARMIN}		-5		dB	D
4.3	Total internal amplification ⁽³⁾		G_{MAX}		71		dB	D
4.4	Center frequency fusing accuracy of bandpass	$V_S = 5\text{V}$, $T_{amb} = 25^{\circ}\text{C}$	f_{0_FUSE}	-3	f_0	+3	%	A
4.5	Overall accuracy center frequency of bandpass		f_0	-6.7	f_0	+4.1	%	C
4.6	BPF bandwidth: type N0 - N3	-3 dB; $f_0 = 38\text{ kHz}$; see Figure 5-4 on page 7	B		3.5		kHz	C
	BPF bandwidth: type N6, N7	-3 dB; $f_0 = 38\text{ kHz}$; Figure 5-4 on page 7	B		5.4		kHz	C

*) 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

4.1 ESD

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

4.2 Reliability

Electrical qualification (1000h) in molded SO8 plastic package

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

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

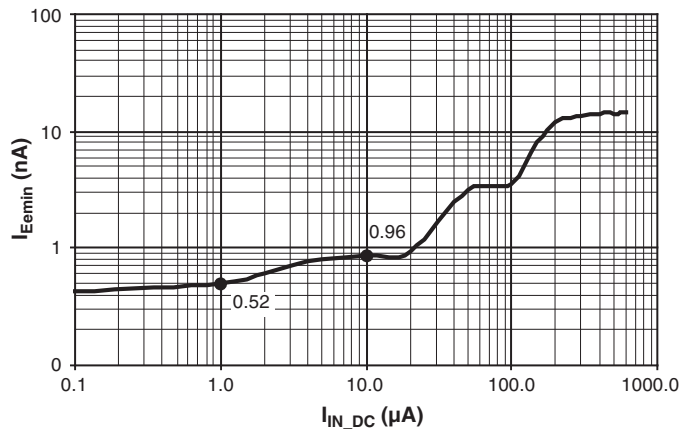


Figure 5-2. V_{IN} versus I_{IN_DC} , $V_S = 5V$

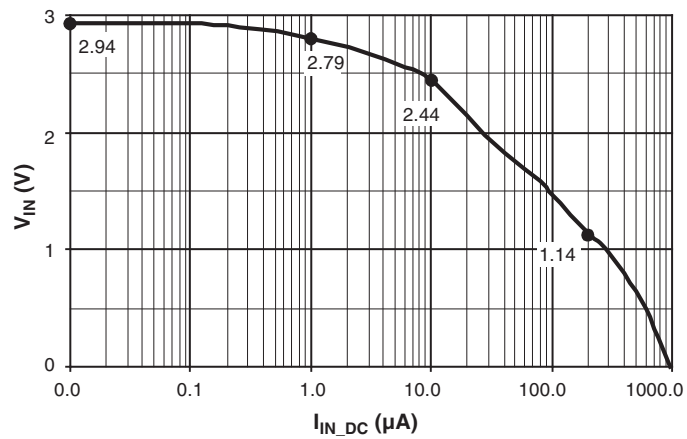


Figure 5-3. Data Transmission Rate, $V_S = 5V$

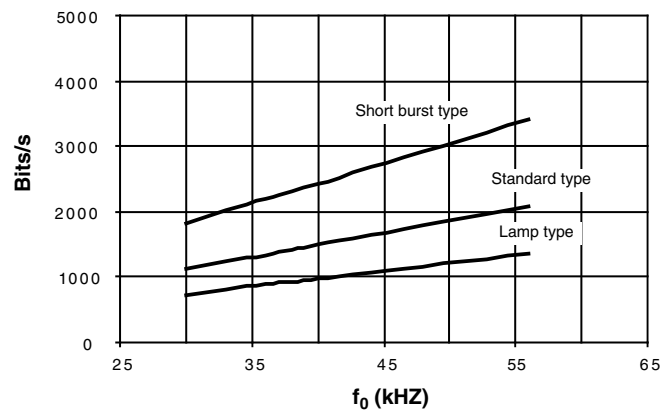
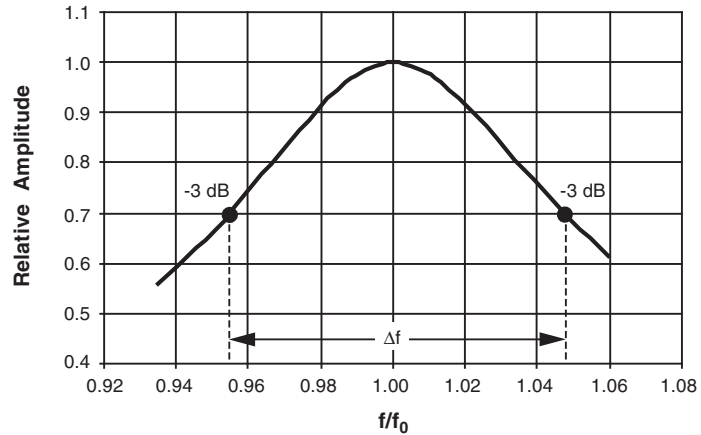
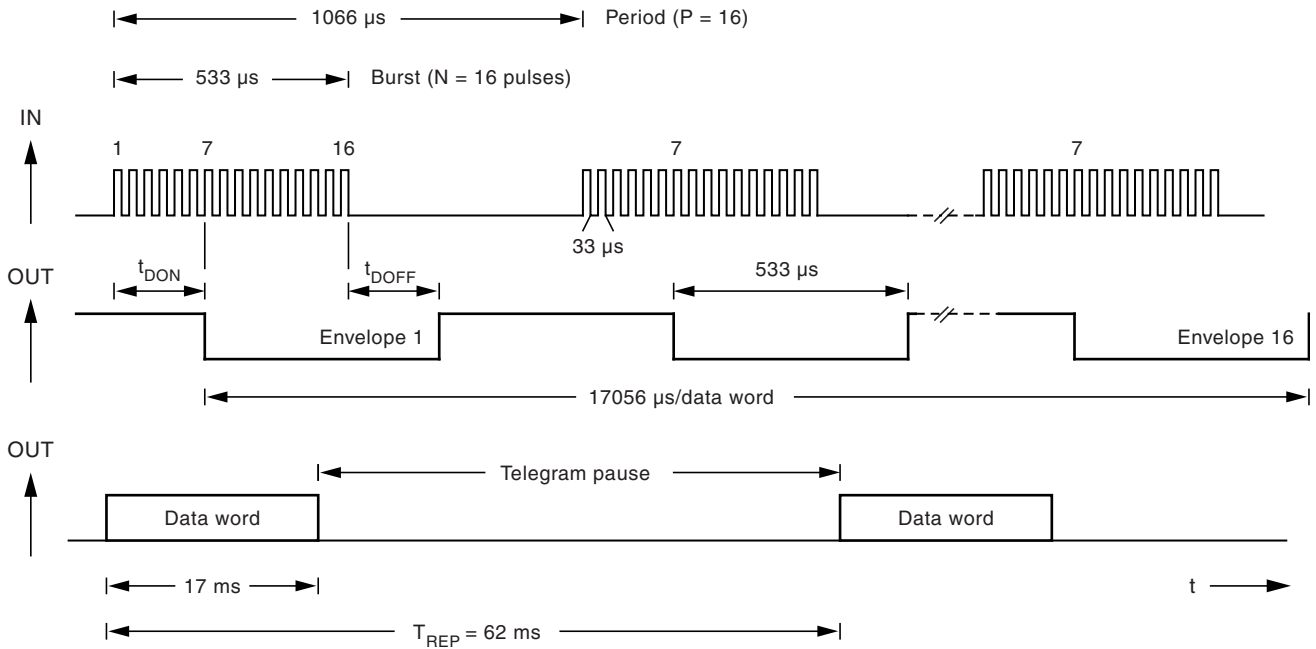


Figure 5-4. Typical Bandpass Curve



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

Figure 5-5. Illustration of Used Terms



Example: $f = 30 \text{ kHz}$, burst with 16 pulses, 16 periods

Figure 5-6. Test Circuit

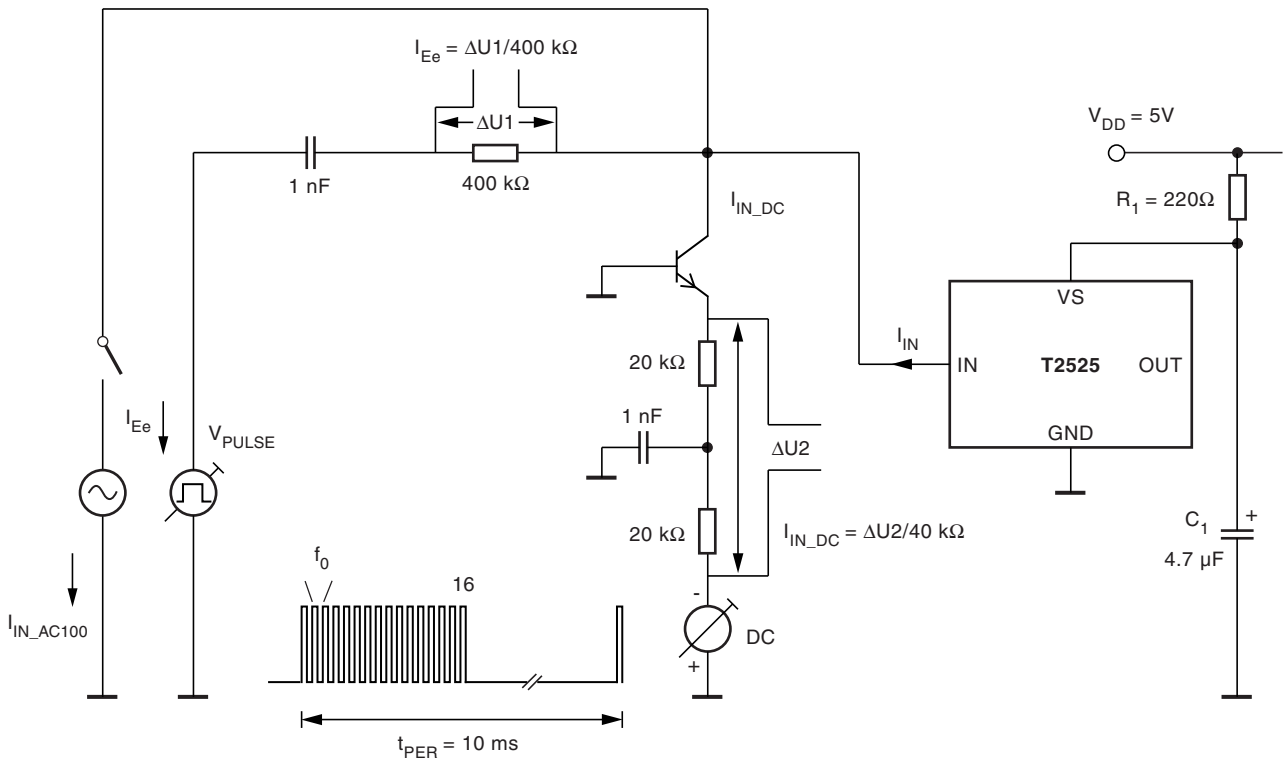
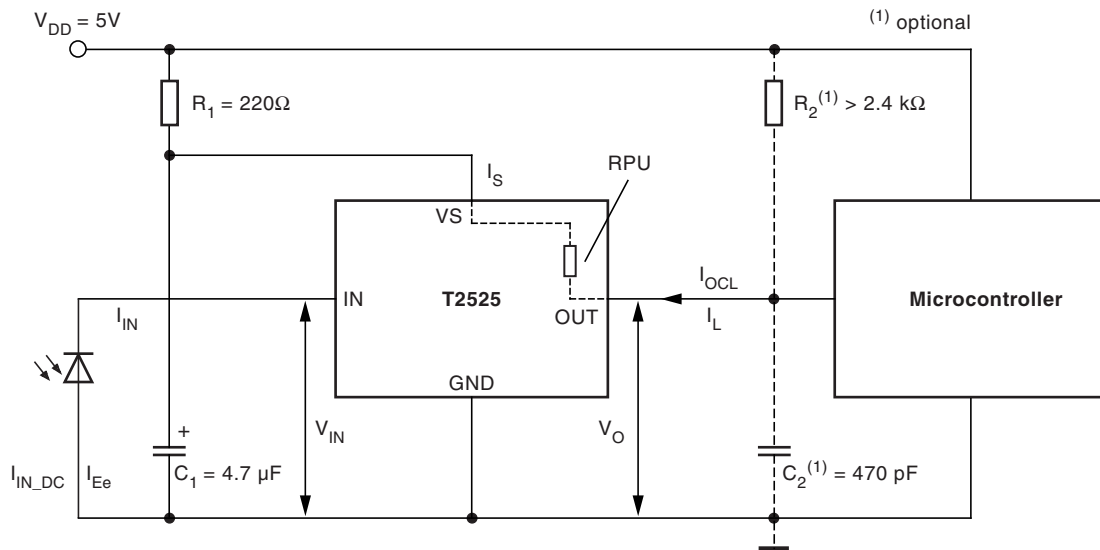
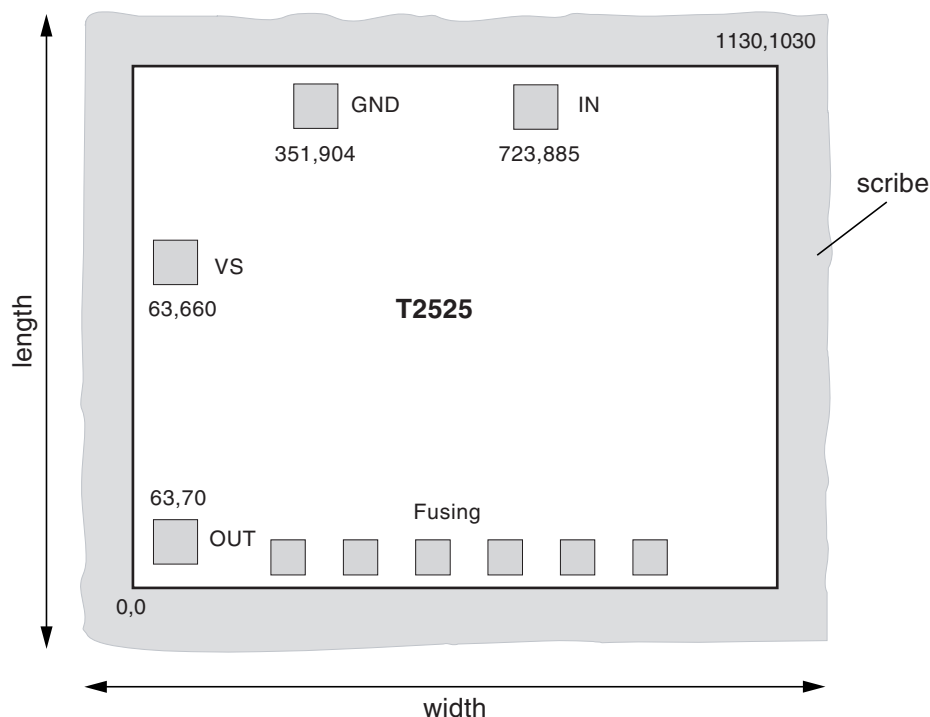


Figure 5-7. Application Circuit



6. Chip Dimensions

Figure 6-1. 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	$290\mu \pm 5\%$
	Pads	$90\mu \times 90\mu$
	Fusing pads	$70\mu \times 70\mu$
	Pad metallurgy	Material
Finish	Thickness	$0.8 \mu\text{m}$
	Material	$\text{Si}_3\text{N}_4/\text{SiO}_2$
	Thickness	$0.7/0.3 \mu\text{m}$

Note: Value depends on manufacture location.

7. 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:
- xx means the used carrier frequency value f_0 30, 33, 36, 38, 40, 44, 56 kHz.
 - Two pad layout versions (see [Figure 8-1](#) and [Figure 8-2](#)) available for different assembly demand
 - Integrated pull-up resistor at pin OUT (see “Electrical Characteristics”)
 - Typical data transmission rate up to bit/s with $f_0 = 56$ kHz, $V_S = 5V$ (see [Figure 5-3 on page 6](#))
 - On request: noise type, data rate type

8. Pad Layout

Figure 8-1. Pad Layout 1

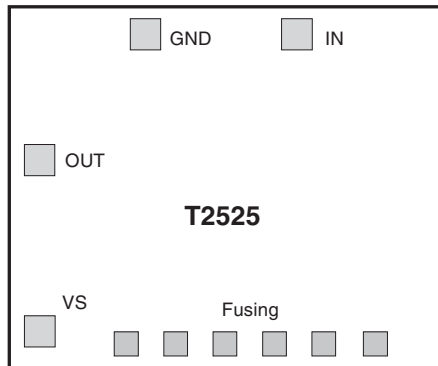
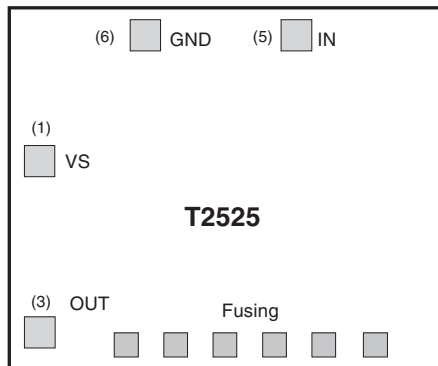


Figure 8-2. Pad Layout 2



9. 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
4657H-AUTO-05/10	<ul style="list-style-type: none"> • Features on page 1 changed • Section 1 “Description” on page 1 changed • Section 2 “Pin Description” on page 3 changed • Section 4 “Thermal Resistance” on page 3 deleted • Section 4 “Electrical Characteristics” on pages 4 to 5 changed • Figure 5-3 “Data Transmission Rate, $V_S = 5V$” on page 6 changed
4657G-AUTO-09/09	<ul style="list-style-type: none"> • Put datasheet in newest template • Ordering Information table changed
4657F-AUTO-10/06	<ul style="list-style-type: none"> • Features on page 1 changed • Applications on page 1 changed • Section 1 “Description” on page 1 changed • 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	<ul style="list-style-type: none"> • Put datasheet in a new template • 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.

© 2010 Atmel Corporation. All rights reserved. Atmel®, 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.