

## Features

- No External Components Except PIN Diode
- Supply-voltage Range: 2.7 V to 5.5 V
- Automatic Sensitivity Adaptation (AGC)
- Automatic Strong Signal Adaptation (ATC)
- Automatic Supply Voltage Adaptation
- Enhanced Immunity against Ambient Light Disturbances
- Available for Carrier Frequencies between 30 kHz to 76 kHz; adjusted by Zener-Diode Fusing  $\pm 2.5\%$
- TTL and CMOS Compatible

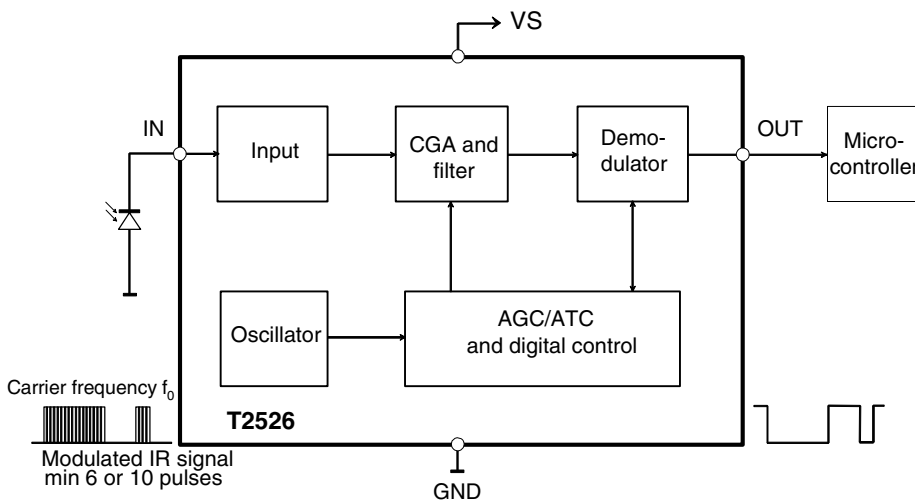
## Applications

- Audio Video Applications
- Home Appliances
- Remote Control Equipment

## Description

The IC T2526 is a complete IR receiver for data communication developed and optimized for use in carrier-frequency-modulated transmission applications. Its function can be described using the block diagram of Figure 1. 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 first to convert the input burst signal to 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 conditions (ambient light, modulated lamps etc.). Other special features are used to adapt to the current application to secure best transmission quality. The T2526 operates in a supply-voltage range from 2.7 V to 5.5 V. By default, the T2526 is optimized for best performance within 2.7 V to 3.3 V.

Figure 1. Block Diagram



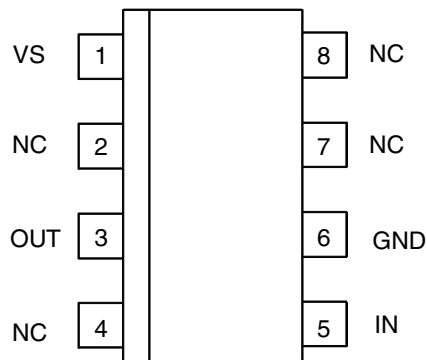
## Low-voltage IR Receiver ASSP

T2526



## Pin Configuration

Figure 2. Pinning SO8 and TSSOP8



## Pin Description

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

## 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.

Parameter	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 $V_S = 5\text{ V}$	$I_{IN}$	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 $T_{amb} = 25^\circ\text{C}$	$P_{tot}$	30	mW

## Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient SO8	$R_{thJA}$	130	k/W
Junction ambient TSSOP8	$R_{thJA}$	tbd	K/W

## Electrical Characteristics, 3-V Operation

$T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 3\text{ V}$  unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>1</b>	<b>Supply</b>								
1.1	Supply-voltage range		1	$V_S$	2.7	3.0	3.3	V	C
1.2	Supply current	$I_{IN}=0$	1	$I_S$	0.7	0.9	1.3	mA	B
<b>2</b>	<b>Output</b>								
2.1	Internal pull-up resistor <sup>(1)</sup>	$T_{amb} = 25^{\circ}\text{C}$ See Figure 12 on page 9	1, 3	$R_{PU}$		30/40		k $\Omega$	A
2.2	Output voltage low	$R_2 = 2.4\text{ k}\Omega$ See Figure 12 on page 9	3, 6	$V_{OL}$			250	mV	B
2.3	Output voltage high		3, 1	$V_{OH}$	$V_S - 0.25$		$V_S$	V	B
2.4	Output current clamping	$R_2 = 0$ See Figure 12 on page 9	3, 6	$I_{OCL}$		8		mA	B
<b>3</b>	<b>Input</b>								
3.1	Input DC current	$V_{IN} = 0$ See Figure 12 on page 9	5	$I_{IN\_DCMAX}$	-150			$\mu\text{A}$	C
3.2	Input DC current See Figure 5 on page 6	$V_{IN} = 0$ ; $V_S = 3\text{ V}$ $T_{amb} = 25^{\circ}\text{C}$	5	$I_{IN\_DCMAX}$		-350		$\mu\text{A}$	B
3.3	Minimum detection threshold current See Figure 3 on page 6	Test signal: See Figure 11 on page 9 $V_S = 3\text{ V}$	3	$I_{Eemin}$		-700		pA	B
3.4	Minimum detection threshold current with AC current disturbance $I_{IN\_AC100} =$ 3 $\mu\text{A}$ at 100 Hz	$T_{amb} = 25^{\circ}\text{C}$ , $I_{IN\_DC} = 1\mu\text{A}$ square pp burst N=16 $f = f_0$ ; $t_{PER} = 10\text{ ms}$ Figure 10 on page 8 BER = 50 <sup>(2)</sup>	3	$I_{Eemin}$		-1500		pA	C
3.5	Maximum detection threshold current with $V_{IN} > 0\text{V}$	Test signal: See Figure 11 on page 9 $V_S = 3\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\mu\text{A}$ square pp burst N = 16 $f = f_0$ ; $t_{PER} = 10\text{ ms}$ Figure 10 on page 8 BER = 5% <sup>(2)</sup>	3	$I_{Eemax}$	-200			$\mu\text{A}$	D

\*) 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

## Electrical Characteristics, 3-V Operation (Continued)

$T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 3\text{ V}$  unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>4</b>	<b>Controlled Amplifier and Filter</b>								
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 <sup>(3)</sup>			$G_{MAX}$		71		dB	D
4.4	Center frequency fusing accuracy of bandpass	$V_S = 3\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$		$f_{03V\_FUZE}$	-2.5	$f_0$	+2.5	%	A
4.5	Overall accuracy center frequency of bandpass			$f_{03V}$	-5.5	$f_0$	+3.5	%	C
4.6	Overall accuracy center frequency of bandpass	$T_{amb} = 0\text{ to }70^{\circ}\text{C}$		$f_{03V}$	-4.5	$f_0$	+3.0	%	C
4.7	BPF bandwidth	-3 dB; $f_0 = 38\text{ kHz}$ ; See Figure 9 on page 8		B		3.8		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

## Electrical Characteristics, 5-V Operation

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>5</b>	<b>Supply</b>								
5.1	Supply-voltage range		1	$V_S$	4.5	5.0	5.5	V	C
5.2	Supply current	$I_{IN} = 0$	1	$I_S$	0.9	1.2	1.6	mA	B
<b>6</b>	<b>Output</b>								
6.1	Internal pull-up resistor <sup>(1)</sup>	$T_{amb} = 25^{\circ}\text{C}$ See Figure 12 on page 9	1, 3	$R_{PU}$		30/40		k $\Omega$	A
6.2	Output voltage low	$R_2 = 2.4\text{ k}\Omega$ See Figure 12 on page 9	3, 6	$V_{OL}$			250	mV	B
6.3	Output voltage high		3, 1	$V_{OH}$	$V_S - 0.25$		$V_S$	V	B
6.4	Output current clamping	$R_2 = 0$ See Figure 12 on page 9	3, 6	$I_{OCL}$		8		mA	B
<b>7</b>	<b>Input</b>								
7.1	Input DC current	$V_{IN} = 0$ See Figure 12 on page 9	5	$I_{IN\_DCMAX}$	-400			$\mu\text{A}$	C
7.2	Input DC-current See Figure 6 on page 7	$V_{IN} = 0$ ; $V_S = 5\text{ V}$ $T_{amb} = 25^{\circ}\text{C}$	5	$I_{IN\_DCMAX}$		-700		$\mu\text{A}$	B

\*) 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

## Electrical Characteristics, 5-V Operation (Continued)

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
7.3	Min. detection threshold current See Figure 4 on page 6	Test signal: See Figure 11 on page 9 $V_S = 5\text{ V}$	3	$I_{Eemin}$		-890		pA	B
7.4	Min. detection threshold current with AC current disturbance $I_{IN\_AC100} = 3\text{ }\mu\text{A}$ at 100 Hz	$T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\text{ }\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ ms}$ Figure 10 on page 8 $BER = 50^{(2)}$	3	$I_{Eemin}$		-2500		pA	C
7.5	Max. detection threshold current with $V_{IN} > 0\text{V}$	Test signal: See Figure 11 on page 9 $V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\text{ }\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ ms}$ Figure 10 on page 8 $BER = 5\%^{(2)}$	3	$I_{Eemax}$	-500			$\mu\text{A}$	D
<b>8</b>	<b>Controlled Amplifier and Filter</b>								
8.1	Maximum value of variable gain (CGA)			$G_{VARMAX}$		51		dB	D
8.2	Minimum value of variable gain (CGA)			$G_{VARMIN}$		-5		dB	D
8.3	Total internal amplification <sup>(3)</sup>			$G_{MAX}$		71		dB	D
8.4	Resulting center frequency fusing accuracy	$f_0$ fused at $V_S = 3\text{ V}$ $V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$		$f_{05V}$		$f_{03V-FUSE} + 0.5$		%	A

\*) 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

### ESD

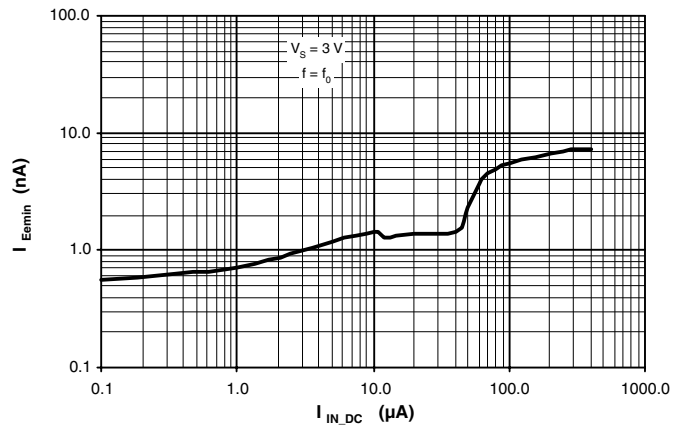
All pins  $\Rightarrow$  2000V HBM; 200V MM, MIL-STD-883C, Method 3015.7

### Reliability

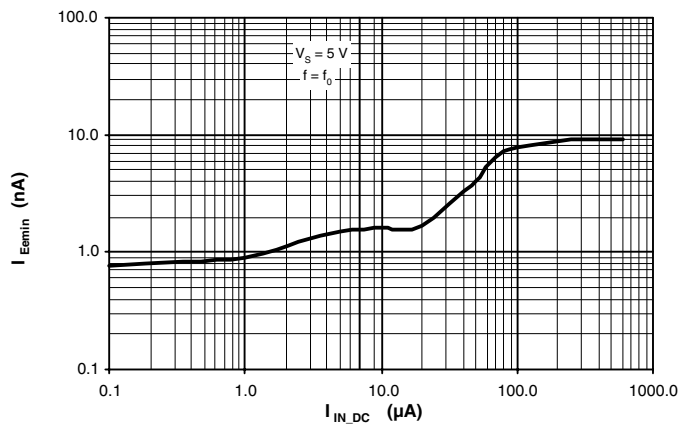
Electrical qualification (1000h) in molded SO8 plastic package

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

**Figure 3.**  $I_{Eemin}$  versus  $I_{IN\_DC}$ ,  $V_S = 3 V$



**Figure 4.**  $I_{Eemin}$  versus  $I_{IN\_DC}$ ,  $V_S = 5 V$



**Figure 5.**  $V_{IN}$  versus  $I_{IN\_DC}$ ,  $V_S = 3 V$

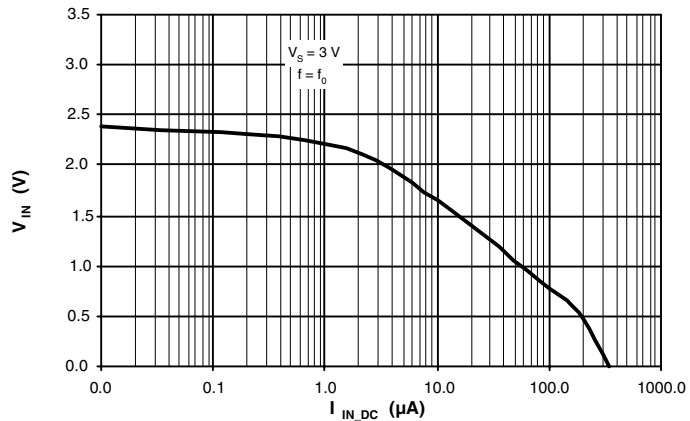


Figure 6.  $V_{IN}$  versus  $I_{IN\_DC}$ ,  $V_S = 5\text{ V}$

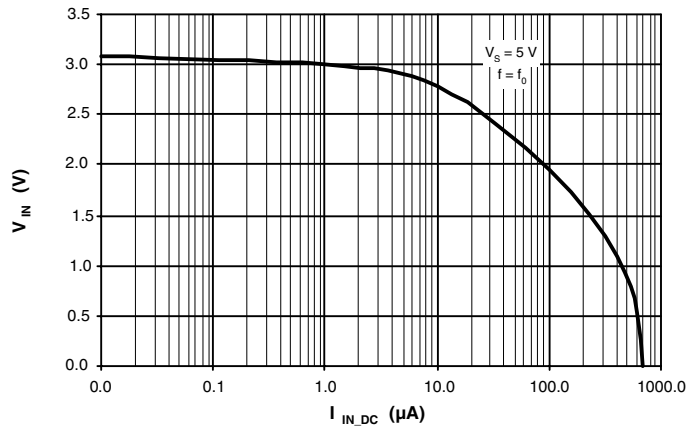


Figure 7. Data Transmission Rate,  $V_S = 3\text{ V}$

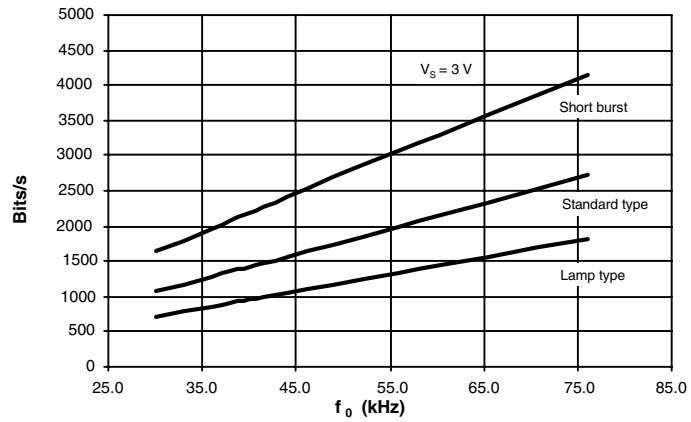
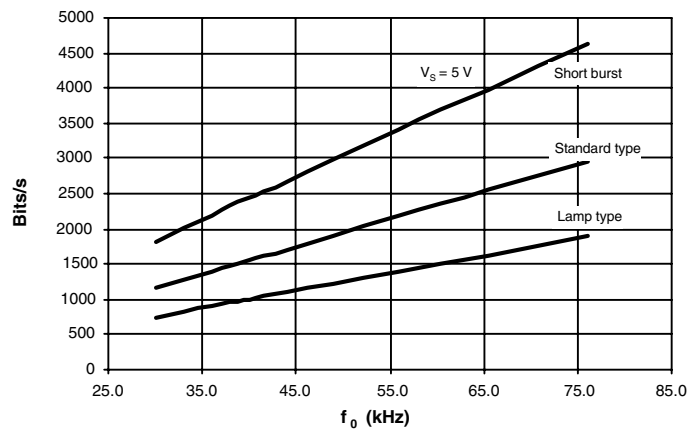
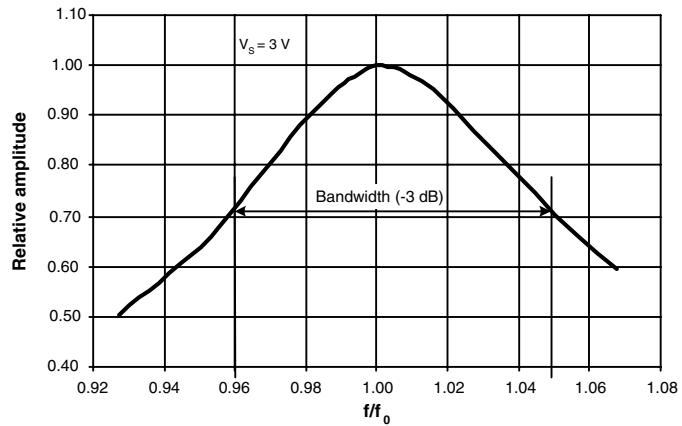


Figure 8. Data Transmission Rate,  $V_S = 5\text{ V}$



**Figure 9.** Typical Bandpass Curve

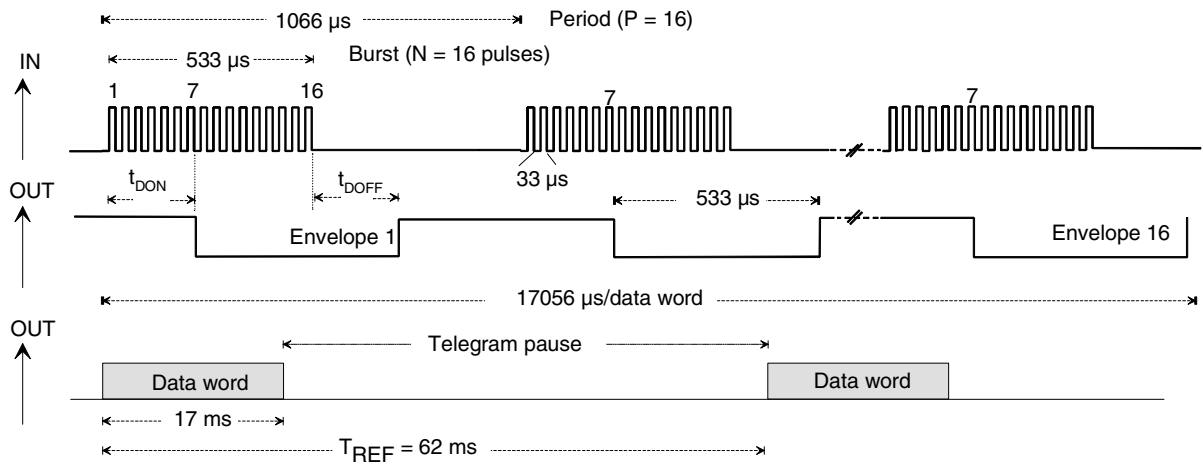


$Q = f/f_0/B$ ;  $B \Rightarrow$  -3 dB values.

Example:  $Q = 1/(1.047 - 0.954) = 11$

**Figure 10.** Illustration of Used Terms

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

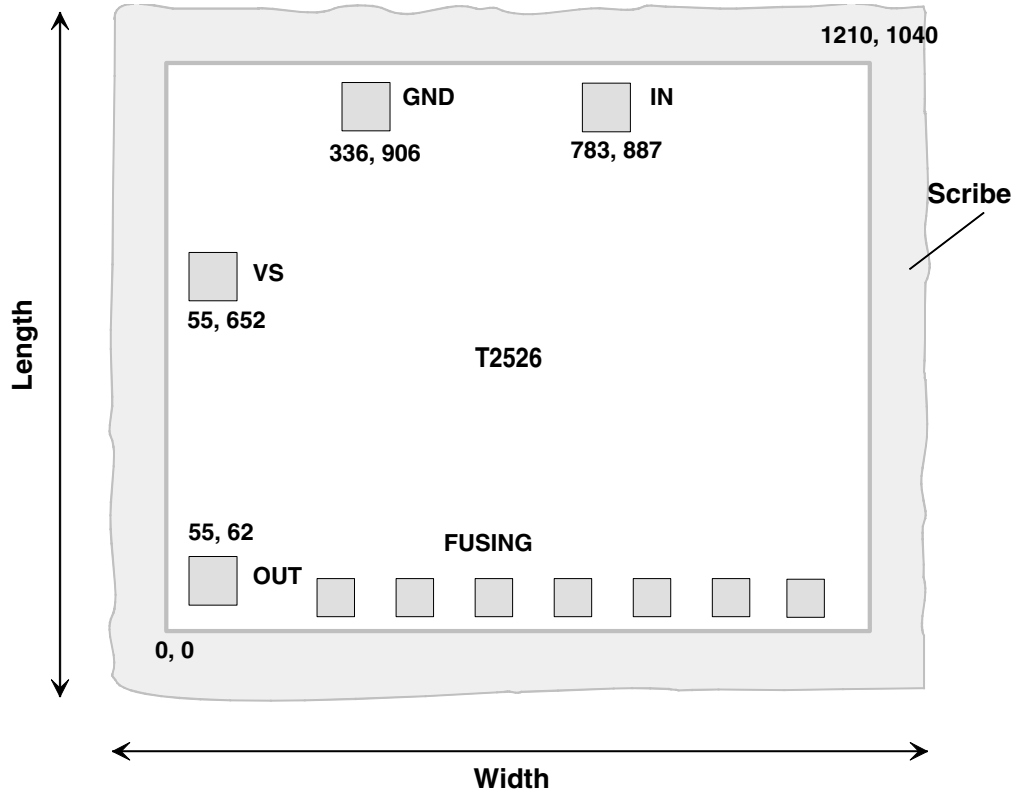






# Chip Dimensions

Figure 13. Chip Size in  $\mu\text{m}$



Note: Pad coordinates are given for lower left corner of the pad in  $\mu\text{m}$  from the origin 0,0

<b>Dimensions</b>	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	$70 \mu \times 70 \mu$
<b>Pad metallurgy</b>	Material	AlCu/AlSiTi <sup>(1)</sup>
	Thickness	$0.8 \mu\text{m}$
<b>Finish</b>	Material	$\text{Si}_3\text{N}_4/\text{SiO}_2$
	Thickness	$0.7/0.3 \mu\text{m}$

Note: 1. Value depends on manufacture location.

## Ordering Information

Delivery: unsawn wafers (DDW) in box, SO8 (150 mil) and TSSOP8 (3 mm body).

Extended Type Number	PL <sup>(2)</sup>	R <sub>PU</sub> <sup>(3)</sup>	D <sup>(4)</sup>	Type
T2526N0xx <sup>(1)</sup> -yyy <sup>(5)</sup>	2	30	2179	<b>Standard type:</b> ≥ 10 pulses, enhanced sensibility, high data rate
T2526N1xx <sup>(1)</sup> -DDW	1	30	2179	
T2526N2xx <sup>(1)</sup> -yyy <sup>(5)</sup>	2	40	1404	<b>Lamp type:</b> ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
T2526N3xx <sup>(1)</sup> -DDW	1	40	1404	
T2526N6xx <sup>(1)</sup> -yyy <sup>(5)</sup>	2	30	3415	<b>Short burst type:</b> ≥ 6 pulses, enhanced data rate
T2526N7xx <sup>(1)</sup> -DDW	1	30	3415	

- Notes:
- xx means the used carrier frequency value  $f_0$  30, 33, 36, 38, 40, 44 or 56 kHz (76 kHz type on request)
  - Two pad layout versions (see Figure 14 and Figure 15) 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,  $V_S = 5$  V (see Figure 10 on page 8)
  - yyy means kind of packaging:  
 .....DDW -> unsawn wafers in box  
 .....6AQ -> (only on request, TSSOP8 taped and reeled)

### Pad Layout

Figure 14. Pad Layout 1 (DDW only)

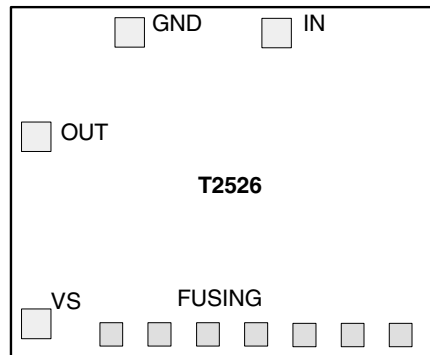
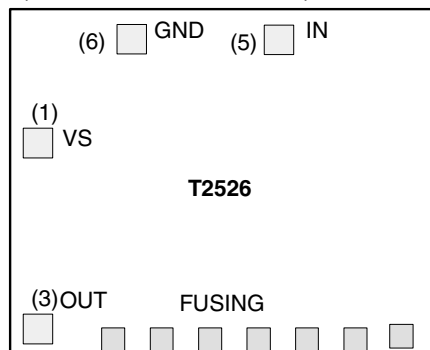


Figure 15. Pad Layout 2 (DDW, SO8 or TSSOP8)





## Atmel Corporation

2325 Orchard Parkway  
San Jose, CA 95131, USA  
Tel: 1(408) 441-0311  
Fax: 1(408) 487-2600

## Regional Headquarters

### Europe

Atmel Sarl  
Route des Arsenalux 41  
Case Postale 80  
CH-1705 Fribourg  
Switzerland  
Tel: (41) 26-426-5555  
Fax: (41) 26-426-5500

### Asia

Room 1219  
Chinachem Golden Plaza  
77 Mody Road Tsimshatsui  
East Kowloon  
Hong Kong  
Tel: (852) 2721-9778  
Fax: (852) 2722-1369

### 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

## Atmel Operations

### Memory

2325 Orchard Parkway  
San Jose, CA 95131, USA  
Tel: 1(408) 441-0311  
Fax: 1(408) 436-4314

### Microcontrollers

2325 Orchard Parkway  
San Jose, CA 95131, USA  
Tel: 1(408) 441-0311  
Fax: 1(408) 436-4314

La Chantrerie  
BP 70602  
44306 Nantes Cedex 3, France  
Tel: (33) 2-40-18-18-18  
Fax: (33) 2-40-18-19-60

### ASIC/ASSP/Smart Cards

Zone Industrielle  
13106 Rousset Cedex, France  
Tel: (33) 4-42-53-60-00  
Fax: (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.  
Colorado Springs, CO 80906, USA  
Tel: 1(719) 576-3300  
Fax: 1(719) 540-1759

Scottish Enterprise Technology Park  
Maxwell Building  
East Kilbride G75 0QR, Scotland  
Tel: (44) 1355-803-000  
Fax: (44) 1355-242-743

### RF/Automotive

Theresienstrasse 2  
Postfach 3535  
74025 Heilbronn, Germany  
Tel: (49) 71-31-67-0  
Fax: (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.  
Colorado Springs, CO 80906, USA  
Tel: 1(719) 576-3300  
Fax: 1(719) 540-1759

### Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Datacom

Avenue de Rochepleine  
BP 123  
38521 Saint-Egreve Cedex, France  
Tel: (33) 4-76-58-30-00  
Fax: (33) 4-76-58-34-80

---

### Literature Requests

[www.atmel.com/literature](http://www.atmel.com/literature)

**Disclaimer:** Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

© Atmel Corporation 2003. All rights reserved.

Atmel® and combinations thereof are the registered trademarks of Atmel Corporation or its subsidiaries.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.