

#### Features

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- No external components except PIN diode
- Supply-voltage range: 2.7V to 5.5V
- High sensitivity due to automatic sensitivity adaption (AGC) and automatic strong signal adaption (ATC)
- Automatic supply voltage adaptation
- High immunity against disturbances from daylight and lamps
- Small size and innovative pad layout
- Available for carrier frequencies between 33kHz to 40kHz and 56kHz; adjusted by zener diode fusing  $\pm 2.5\%$
- TTL and CMOS compatible

#### Applications

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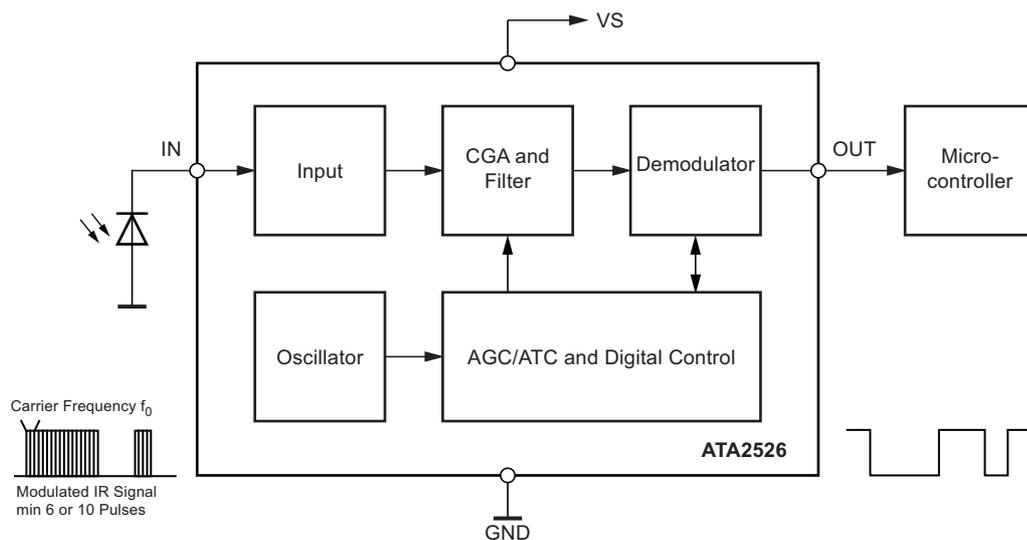
- Home entertainment applications
- Home appliances
- Remote control equipment

# 1. Description

The Atmel® IC ATA2526 is a complete IR receiver for data communication that has been developed and optimized for use in carrier-frequency-modulated transmission applications. The IC combines small size with high sensitivity suppression of noise as caused by daylight and lamps. An innovative and patented pad layout offers unique flexibility for IR receiver module assembly. The Atmel ATA2526 is available with standard frequencies (33, 36, 37, 38, 40, 56kHz) and 3 different noise suppression regulation types (standard, lamp, short burst), thus covering the requirements of different high-volume remote control solutions (please refer to selection guide available for Atmel ATA2525/ATA2526). The Atmel ATA2526 operates in a supply voltage range of 2.7V to 5.5V.

The function of the Atmel ATA2526 can be described using the block diagram of Figure 1-1. The input stage has 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. 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 features can be used to adapt the device to the individual application to ensure best transmission quality.

Figure 1-1. Block Diagram



## 2. 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 $V_S = 5V$	$I_{IN}$	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

## 3. Electrical Characteristics, 3-V Operation

$T_{amb} = -25^\circ C$  to  $+85^\circ C$ ,  $V_S = 2.7V$  to  $3.3V$  unless otherwise specified.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>1 Supply</b>								
1.1	Supply-voltage range		$V_S$	2.7	3.0	3.3	V	C
1.2	Supply current	$I_{IN} = 0$	$I_S$	0.7	0.9	1.3	mA	B
<b>2 Output</b>								
2.1	Internal pull-up resistor	$T_{amb} = 25^\circ C$ see <a href="#">Figure 5-10 on page 9</a>	$R_{PU}$		40		k $\Omega$	A
2.2	Output voltage low	$R_2 = 1.4k\Omega$ see <a href="#">Figure 5-10 on page 9</a>	$V_{OL}$			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 <a href="#">Figure 5-10 on page 9</a>	$I_{OCL}$		8		mA	B
<b>3 Input</b>								
3.1	Input DC current	$V_{IN} = 0$ see <a href="#">Figure 5-10 on page 9</a>	$I_{IN\_DCMAX}$	-150			$\mu A$	C
3.2	Input DC current see <a href="#">Figure 5-3 on page 6</a>	$V_{IN} = 0$ ; $V_S = 3V$ $T_{amb} = 25^\circ C$	$I_{IN\_DCMAX}$		-350		$\mu A$	B
3.3	Minimum detection threshold current see <a href="#">Figure 5-1 on page 6</a>	Test signal: see <a href="#">Figure 5-9 on page 9</a> $V_S = 3V$	$I_{Eemin}$		-800		pA	B
3.4	Minimum detection threshold current with AC current disturbance $I_{IN\_AC100} = 3\mu A$ at 100Hz	$T_{amb} = 25^\circ C$ , $I_{IN\_DC} = 1\mu A$ square pp burst N = 16 $f = f_0$ ; $t_{PER} = 10ms$ see <a href="#">Figure 5-8 on page 8</a> BER = 50 <sup>(1)</sup>	$I_{Eemin}$		-1600		pA	C

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

- Notes:
- 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

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

$T_{amb} = -25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_S = 2.7\text{V}$  to  $3.3\text{V}$  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 <a href="#">Figure 5-9 on page 9</a> $V_S = 3\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ms}$ see <a href="#">Figure 5-8 on page 8</a> $\text{BER} = 5\%^{(1)}$	$I_{Eemax}$	-200			$\mu\text{A}$	D
<b>4 Controlled Amplifier and Filter</b>								
4.1	Maximum value of variable gain (CGA)	$V_S = 3\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{VARMAX}$		50		dB	D
4.2	Minimum value of variable gain (CGA)	$V_S = 3\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{VARMIN}$		-6		dB	D
4.3	Total internal amplification <sup>(2)</sup>	$V_S = 3\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{MAX}$		72		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	$T_{amb} = 0$ to $70^{\circ}\text{C}$	$f_{03V}$	-4.5	$f_0$	+3.0	%	C
4.7	BPF bandwidth	-3dB; $f_0 = 38\text{kHz}$ ; see <a href="#">Figure 5-7 on page 8</a>	B		3.8		kHz	C

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

- Notes:
- 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, 5-V Operation

$T_{amb} = -25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_S = 4.5\text{V}$  to  $5.5\text{V}$  unless otherwise specified.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>5 Supply</b>								
5.1	Supply-voltage range		$V_S$	4.5	5.0	5.5	V	C
5.2	Supply current	$I_{IN} = 0$	$I_S$	0.9	1.2	1.6	mA	B
<b>6 Output</b>								
6.1	Internal pull-up resistor	$T_{amb} = 25^{\circ}\text{C}$ see <a href="#">Figure 5-10 on page 9</a>	$R_{PU}$		40		$\text{k}\Omega$	A
6.2	Output voltage low	$R_2 = 2.4\text{k}\Omega$ see <a href="#">Figure 5-10 on page 9</a>	$V_{OL}$			250	mV	B
6.3	Output voltage high		$V_{OH}$	$V_S - 0.25$		$V_S$	V	B
6.4	Output current clamping	$R_2 = 0$ see <a href="#">Figure 5-10 on page 9</a>	$I_{OCL}$		8		mA	B

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

- Notes:
- 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, 5-V Operation (Continued)

$T_{amb} = -25^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_S = 4.5\text{V}$  to  $5.5\text{V}$  unless otherwise specified.

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>7 Input</b>								
7.1	Input DC current	$V_{IN} = 0$ see Figure 5-10 on page 9	$I_{IN\_DCMAX}$	-400			$\mu\text{A}$	C
7.2	Input DC current see Figure 5-4 on page 7	$V_{IN} = 0$ ; $V_S = 5\text{V}$ $T_{amb} = 25^{\circ}\text{C}$	$I_{IN\_DCMAX}$		-700		$\mu\text{A}$	B
7.3	Minimum detection threshold current see Figure 5-2 on page 6	Test signal: see Figure 5-9 on page 9 $V_S = 5\text{V}$ $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ms}$ see Figure 5-8 on page 8 $BER = 50^{(1)}$	$I_{Eemin}$		-1000		$\mu\text{A}$	B
7.4	Minimum detection threshold current with AC current disturbance $I_{IN\_AC100} = 3\mu\text{A}$ at 100Hz	Test signal: see Figure 5-9 on page 9 $V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ms}$ see Figure 5-8 on page 8 $BER = 50^{(1)}$	$I_{Eemin}$		-2500		$\mu\text{A}$	C
7.5	Maximum detection threshold current with $V_{IN} > 0\text{V}$	Test signal: see Figure 5-9 on page 9 $V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$ $I_{IN\_DC} = 1\mu\text{A}$ square pp burst $N = 16$ $f = f_0$ ; $t_{PER} = 10\text{ms}$ see Figure 5-8 on page 8 $BER = 5\%^{(1)}$	$I_{Eemax}$	-500			$\mu\text{A}$	D
<b>8 Controlled Amplifier and Filter</b>								
8.1	Maximum value of variable gain (CGA)	$V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{VARMAX}$		50		dB	D
8.2	Minimum value of variable gain (CGA)	$V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{VARMIN}$		-6		dB	D
8.3	Total internal amplification <sup>(2)</sup>	$V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$G_{MAX}$		72		dB	D
8.4	Resulting center frequency fusing accuracy	$f_0$ fused at $V_S = 3\text{V}$ $V_S = 5\text{V}$ , $T_{amb} = 25^{\circ}\text{C}$	$f_{05\text{V}}$		$f_{03\text{V-FUSE}}$ + 0.5		%	C

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

- Notes:
1. 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
  2. After transformation of input current into voltage

### 4.1 Reliability

Electrical qualification (1000h at  $150^{\circ}\text{C}$ ) in molded SO8 plastic package

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

Figure 5-1.  $I_{Eemin}$  versus  $I_{IN\_DC}$ ,  $V_S = 3V$

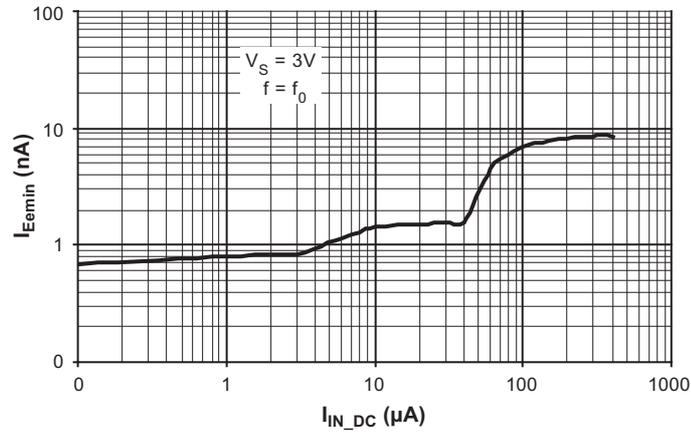


Figure 5-2.  $I_{Eemin}$  versus  $I_{IN\_DC}$ ,  $V_S = 5V$

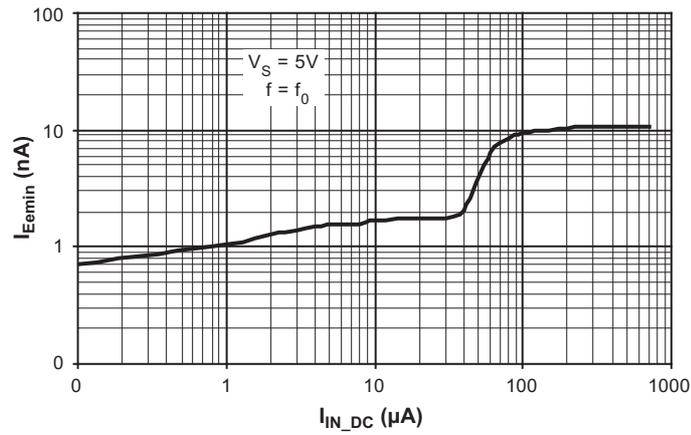


Figure 5-3.  $V_{IN}$  versus  $I_{IN\_DC}$ ,  $V_S = 3V$

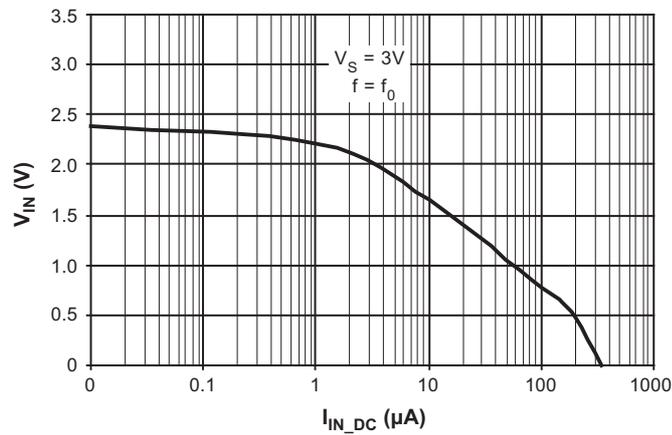


Figure 5-4.  $V_{IN}$  versus  $I_{IN\_DC}$ ,  $V_S = 5V$

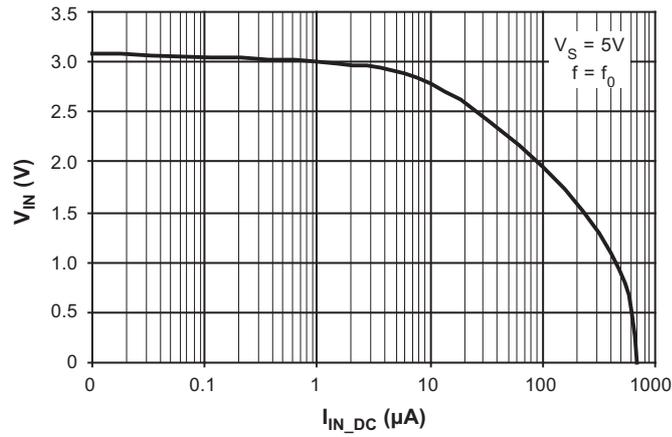


Figure 5-5. Data Transmission Rate,  $V_S = 3V$

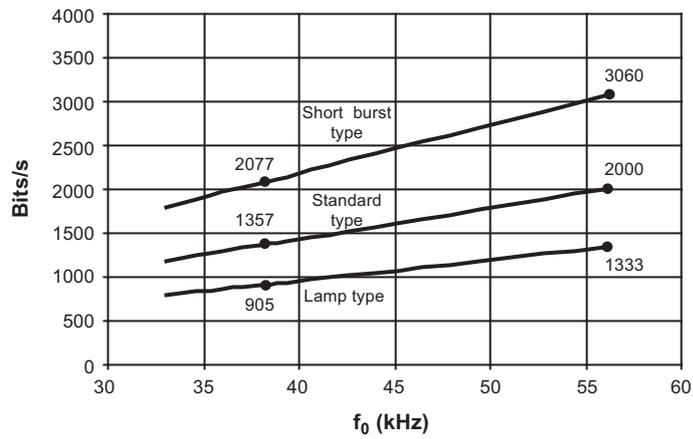
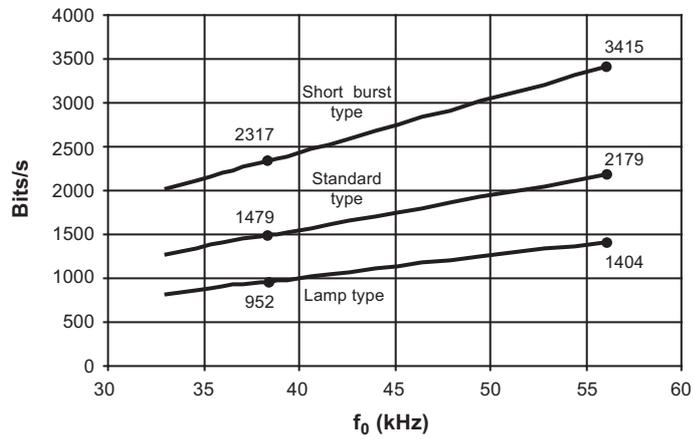
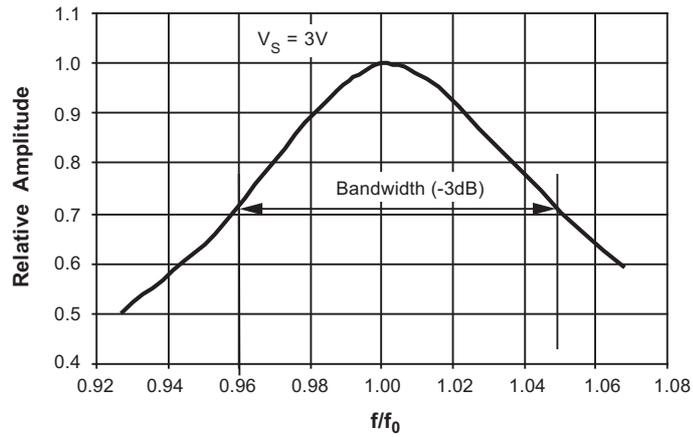


Figure 5-6. Data Transmission Rate,  $V_S = 5V$



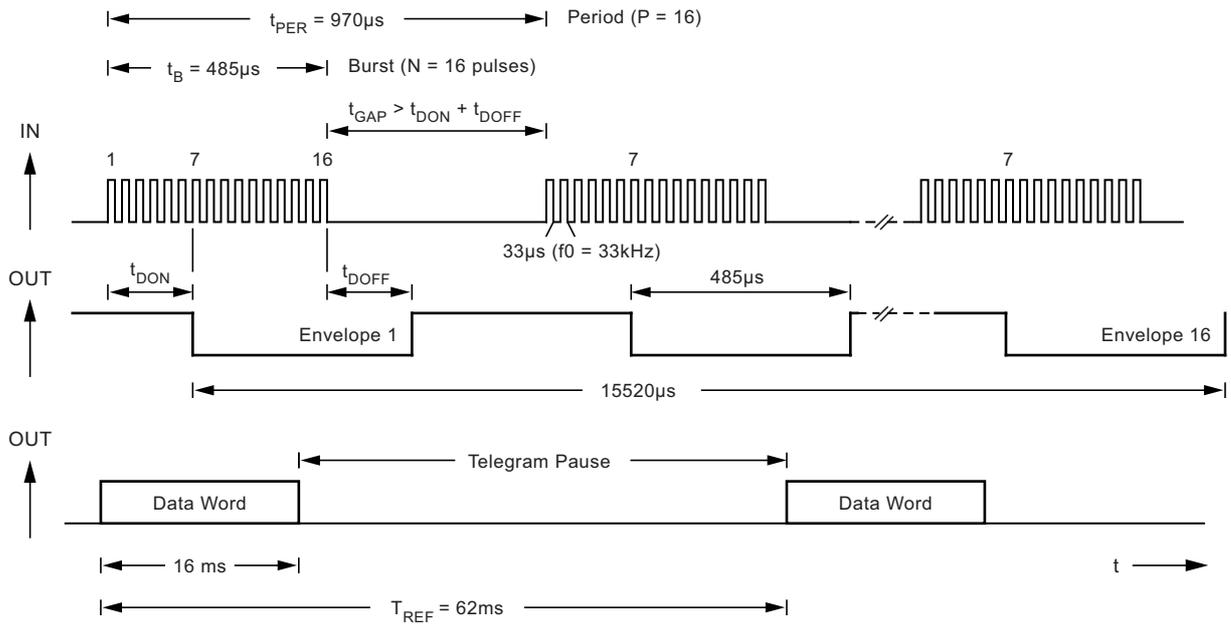
**Figure 5-7. Typical Bandpass Curve**



$Q = f/f_0/B$ ;  $B \rightarrow -3\text{dB values}$

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

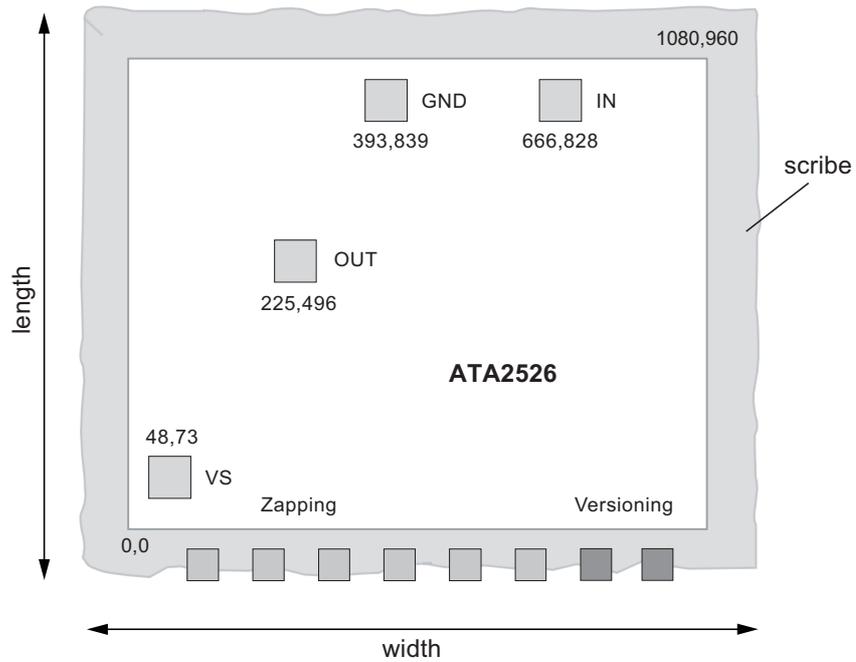
**Figure 5-8. Illustration of Used Terms, Example:  $f = 33\text{kHz}$ , burst with 16 pulses, 16 periods**





## 6. Chip Dimensions

Figure 6-1. 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

Dimensions	Length inclusive scribe	1.04mm
	Width inclusive scribe	1.20mm
	Thickness	290 $\mu\text{m}$ $\pm$ 5%
Pads	Pads	80 $\mu\text{m}$ $\times$ 80 $\mu\text{m}$
	Fusing pads	60 $\mu\text{m}$ $\times$ 60 $\mu\text{m}$
Pad metallurgy	Material	AlCu/AlSiTi <sup>(1)</sup>
	Thickness	0.8 $\mu\text{m}$
Finish	Material	Si <sub>3</sub> N <sub>4</sub> /SiO <sub>2</sub>
	Thickness	0.7/0.3 $\mu\text{m}$

Note: 1. Value depends on manufacture location.

## 7. Ordering Information

Delivery: unsawn wafers (DDW) in box

Extended Type Number	D <sup>(2)</sup>	Type
ATA2526S1xx <sup>(1)</sup> C-DDW	2175	<b>Standard type:</b> ≥ 10 pulses, high data rate
ATA2526S3xx <sup>(1)</sup> C-DDW	1400	<b>Lamp type:</b> ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
ATA2526S7xx <sup>(1)</sup> C-DDW	3415	<b>Short burst type:</b> ≥ 6 pulses, highest data rate

- Notes:
- xx means carrier frequency value (33, 36, 37, 38 or 40kHz and 56kHz)
  - Maximum data transmission rate up to bits/s with  $f_0 = 56\text{kHz}$ ,  $V_S = 5\text{V}$  (see [Figure 5-6 on page 7](#))

### 7.1 Pad Layout

Figure 7-1. Pad Layout

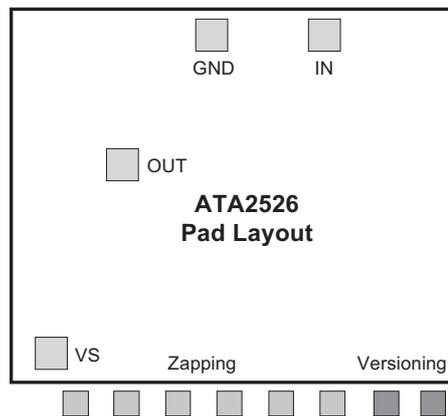


Table 7-1. Pin Description

Symbol	Function
OUT	Data output
VS	Supply voltage
GND	GND
IN	Input pin diode
Zapping	$f_0$ adjust
Versioning	Type adjust

## 8. 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
4905G-AUTO-04/14	<ul style="list-style-type: none"><li>• Put datasheet in the latest template</li></ul>
4905F-AUTO-05/10	<ul style="list-style-type: none"><li>• Thermal Resistance table deleted</li><li>• Pin columns in Electrical Characteristics tables deleted</li></ul>
4905E-AUTO-09/09	<ul style="list-style-type: none"><li>• Put datasheet in newest template</li><li>• Section 8 “Ordering Information” on page 12 changed</li></ul>
4905D-AUTO-10/06	<ul style="list-style-type: none"><li>• Features on page 1 changed</li><li>• Applications on page 1 changed</li><li>• Section 1 “Description” on page 1 changed</li><li>• Section 2 “Pin Configuration” on page 2 changed</li><li>• Number 2.2, 3.3 and 3.4 of Section 5 “Electrical Characteristics, 3-V Operation” on pages 3 to 4 changed</li><li>• Number 7.3, 7.4 and 8.4 of Section 5 “Electrical Characteristics, 3-V Operation” on page 5 to 6 changed</li><li>• Section 6.1 “ESD” on page 6 deleted</li><li>• Figure 7-10 “Application Circuit” on page 10 changed</li><li>• Section 9 “Ordering Information” on page 12 changed</li><li>• Rename Figure 9-1 on page 12</li></ul>
4905C-AUTO-04/06	<ul style="list-style-type: none"><li>• Section 9 “Ordering Information” on page 12 changed</li></ul>
4905B-AUTO-04/06	<ul style="list-style-type: none"><li>• Put datasheet in a new template</li><li>• Section 8 “Chip Dimensions” on page 11 changed</li></ul>



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