Features

- 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 33 kHz to 40 kHz and 56 kHz; adjusted by Zener-Diode Fusing ±2.5%
- TTL and CMOS Compatible

Applications

- Home Entertainment Applications
- Home Appliances
- Remote Control Equipment

Low-voltage IR Receiver ASSP

ATA2526

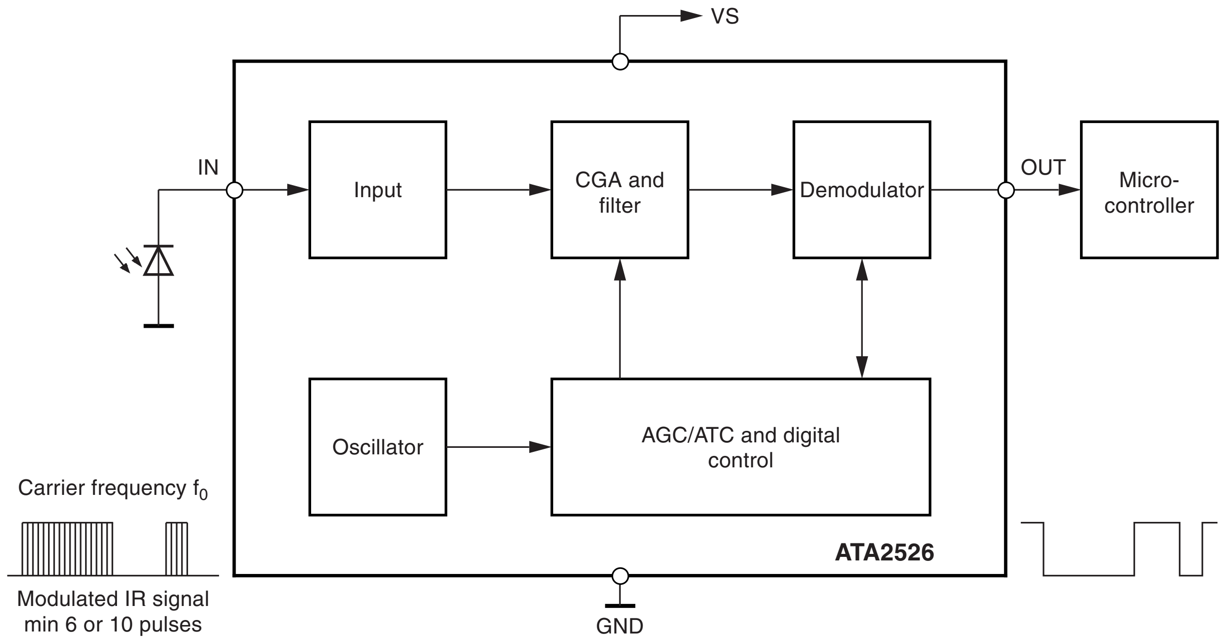
1. Description

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

The function of the ATA2526 can be described using the block diagram of 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 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.

4905D–AUTO–10/06

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°C	P_{tot}	30	mW

3. Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient TSSOP8	R_{thJA}	110	K/W

4. Electrical Characteristics, 3-V Operation

T_{amb} = –25°C to +85°C, V_S = 2.7V to 3.3V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
1	**Supply**								
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
2	**Output**								
2.1	Internal pull-up resistor	T_{amb} = 25°C See Figure 6-10 on page 10	1, 3	R_{PU}		40		kΩ	A
2.2	Output voltage low	R_2 = 1.4 kΩ See Figure 6-10 on page 10	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 6-10 on page 10	3, 6	I_{OCL}		8		mA	B
3	**Input**								
3.1	Input DC current	V_{IN} = 0 See Figure 6-10 on page 10	5	I_{IN_DCMAX}	–150			µA	C
3.2	Input DC current See Figure 6-3 on page 7	V_{IN} = 0; V_S = 3V T_{amb} = 25°C	5	I_{IN_DCMAX}		–350		µA	B

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

T_{amb} = –25°C to +85°C, V_S = 2.7V to 3.3V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.3	Minimum detection threshold current See Figure 6-1 on page 7	Test signal: See Figure 6-9 on page 10 V_S = 3V T_{amb}= 25°C, I_{IN_DC}=1 µA square pp burst N = 16 f = f_0; t_{PER} = 10 ms Figure 6-8 on page 9 BER = 50[1]	3	I_{Eemin}		–800		pA	B
3.4	Minimum detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz		3	I_{Eemin}		–1600		pA	C
3.5	Maximum detection threshold current with V_{IN} > 0V	Test signal: See Figure 6-9 on page 10 V_S = 3V, T_{amb} = 25°C I_{IN_DC} = 1 µA square pp burst N = 16 f = f_0; t_{PER} = 10 ms Figure 6-8 on page 9 BER = 5%[1]	3	I_{Eemax}	–200			µA	D
4	**Controlled Amplifier and Filter**								
4.1	Maximum value of variable gain (CGA)	V_S = 3V, T_{amb} = 25°C		G_{VARMAX}		50		dB	D
4.2	Minimum value of variable gain (CGA)	V_S = 3V, T_{amb} = 25°C		G_{VARMIN}		–6		dB	D
4.3	Total internal amplification[2]	V_S = 3V, T_{amb} = 25°C		G_{MAX}		72		dB	D
4.4	Center frequency fusing accuracy of bandpass	V_S = 3V, T_{amb} = 25°C		f_{03V_FUSE}	–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°C		f_{03V}	–4.5	f_0	+3.0	%	C
4.7	BPF bandwidth	–3 dB; f_0 = 38 kHz; See Figure 6-7 on page 9		B		3.8		kHz	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

5. Electrical Characteristics, 5-V Operation

T_{amb} = –25°C to +85°C, V_S = 4.5V to 5.5V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
5	**Supply**								
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
6	**Output**								
6.1	Internal pull-up resistor	T_{amb} = 25°C See Figure 6-10 on page 10	1, 3	R_{PU}		40		kW	A
6.2	Output voltage low	R_2 = 2.4 kΩ See Figure 6-10 on page 10	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 6-10 on page 10	3, 6	I_{OCL}		8		mA	B
7	**Input**								
7.1	Input DC current	V_{IN} = 0 See Figure 6-10 on page 10	5	I_{IN_DCMAX}	–400			µA	C
7.2	Input DC-current See Figure 6-4 on page 8	V_{IN} = 0; V_S = 5V T_{amb} = 25°C	5	I_{IN_DCMAX}		–700		µA	B
7.3	Min. detection threshold current See Figure 6-2 on page 7	Test signal: See Figure 6-9 on page 10 V_S = 5V T_{amb} = 25°C I_{IN_DC} = 1 µA square pp burst N = 16 f = f_0; t_{PER} = 10 ms Figure 6-8 on page 9 BER = 50(1)	3	I_{Eemin}		–1000		pA	B
7.4	Min. detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz		3	I_{Eemin}		–2500		pA	C
7.5	Max. detection threshold current with V_{IN} > 0V	Test signal: See Figure 6-9 on page 10 V_S = 5V, T_{amb} = 25°C I_{IN_DC} = 1 µA square pp burst N = 16 f = f_0; t_{PER} = 10 ms Figure 6-8 on page 9 BER = 5%(1)	3	I_{Eemax}	–500			µA	D

*) 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

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

T_{amb} = –25°C to +85°C, V_S = 4.5V to 5.5V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
8	**Controlled Amplifier and Filter**								
8.1	Maximum value of variable gain (CGA)	V_S = 5V, T_{amb} = 25°C		G_{VARMAX}		50		dB	D
8.2	Minimum value of variable gain (CGA)	V_S = 5V, T_{amb} = 25°C		G_{VARMIN}		–6		dB	D
8.3	Total internal amplification(2)	V_S = 5V, T_{amb} = 25°C		G_{MAX}		72		dB	D
8.4	Resulting center frequency fusing accuracy	f_0 fused at V_S = 3V V_S = 5V, T_{amb} = 25°C		f_{05V}		$f_{03V\text{-}FUSE}$ + 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

5.1 Reliability

Electrical qualification (1000h at 150°C) in molded SO8 plastic package

6. Typical Electrical Curves at T_{amb} = 25°C

Figure 6-1. I_{Eemin} versus I_{IN_DC}, V_S = 3V

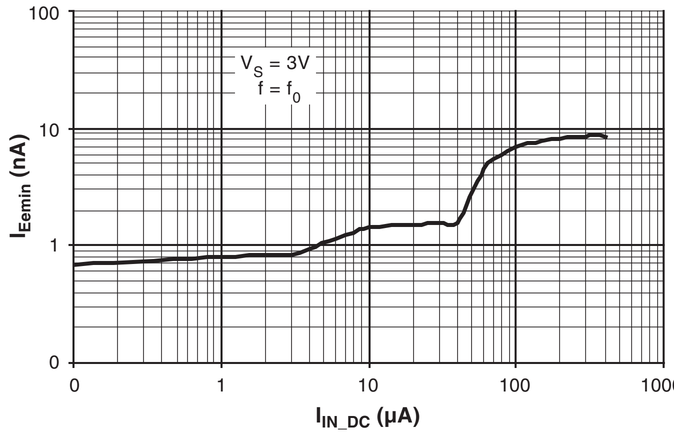


Figure 6-2. I_{Eemin} versus I_{IN_DC}, V_S = 5V

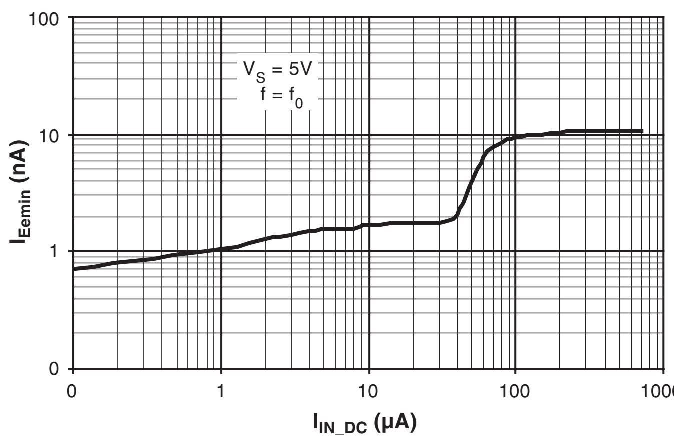


Figure 6-3. V_{IN} versus I_{IN_DC}, V_S = 3V

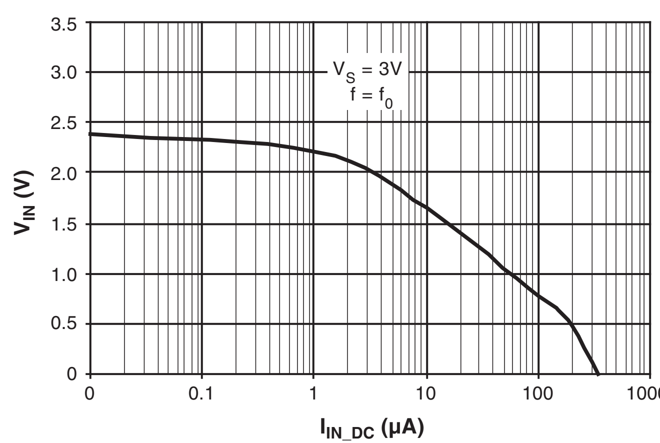


Figure 6-4. V_{IN} versus I_{IN_DC}, V_S = 5V

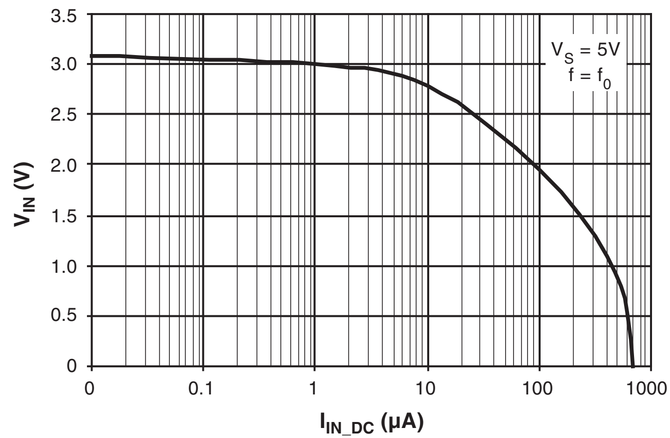


Figure 6-5. Data Transmission Rate, V_S = 3V

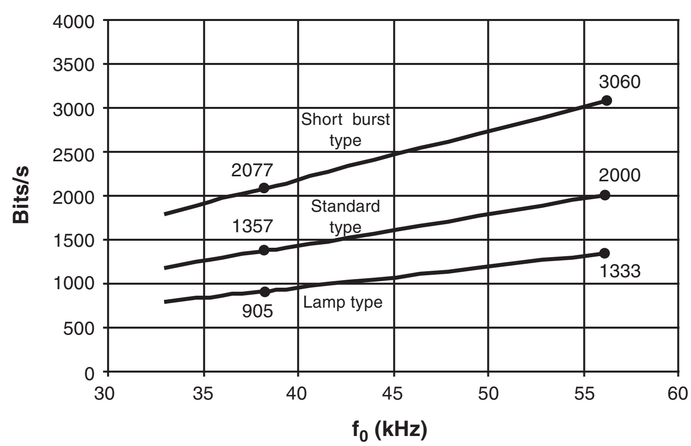


Figure 6-6. Data Transmission Rate, V_S = 5V

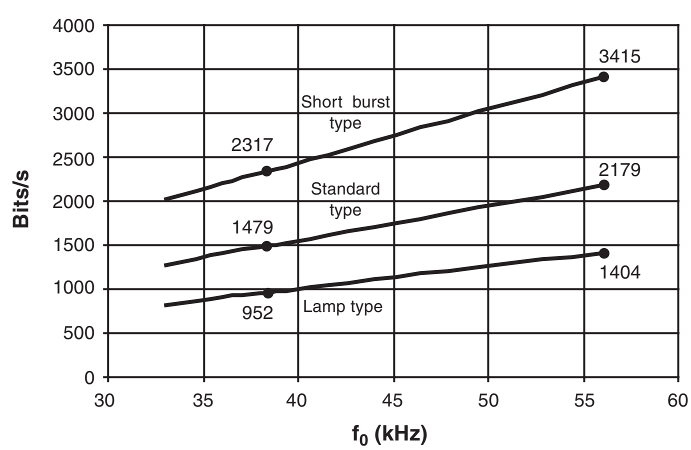
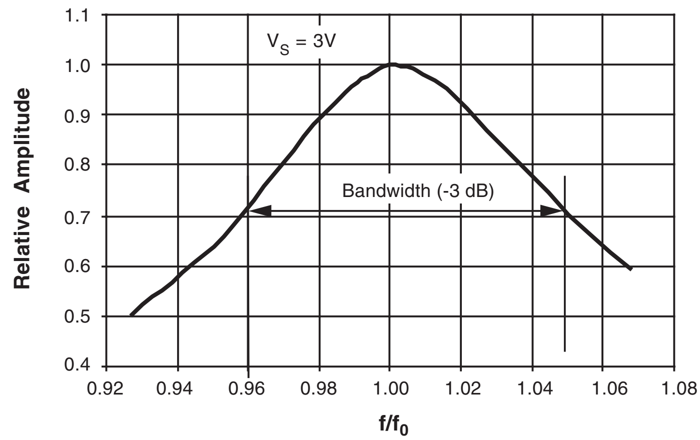


Figure 6-7. Typical Bandpass Curve



Q = $f/f_0/B$; B →–3 dB values.

Example: Q = 1/(1.047 – 0.954) = 11

Figure 6-8. Illustration of Used Terms
Example: f = 33 kHz, burst with 16 pulses, 16 periods

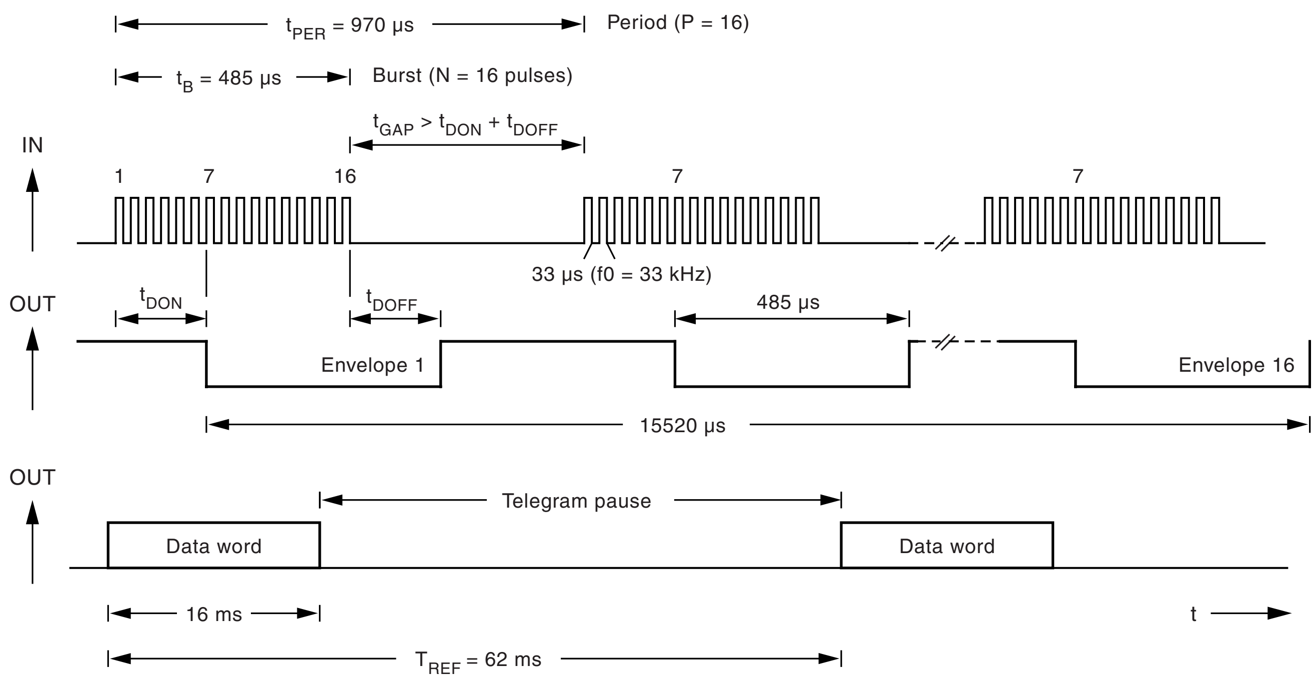


Figure 6-9. Test Circuit

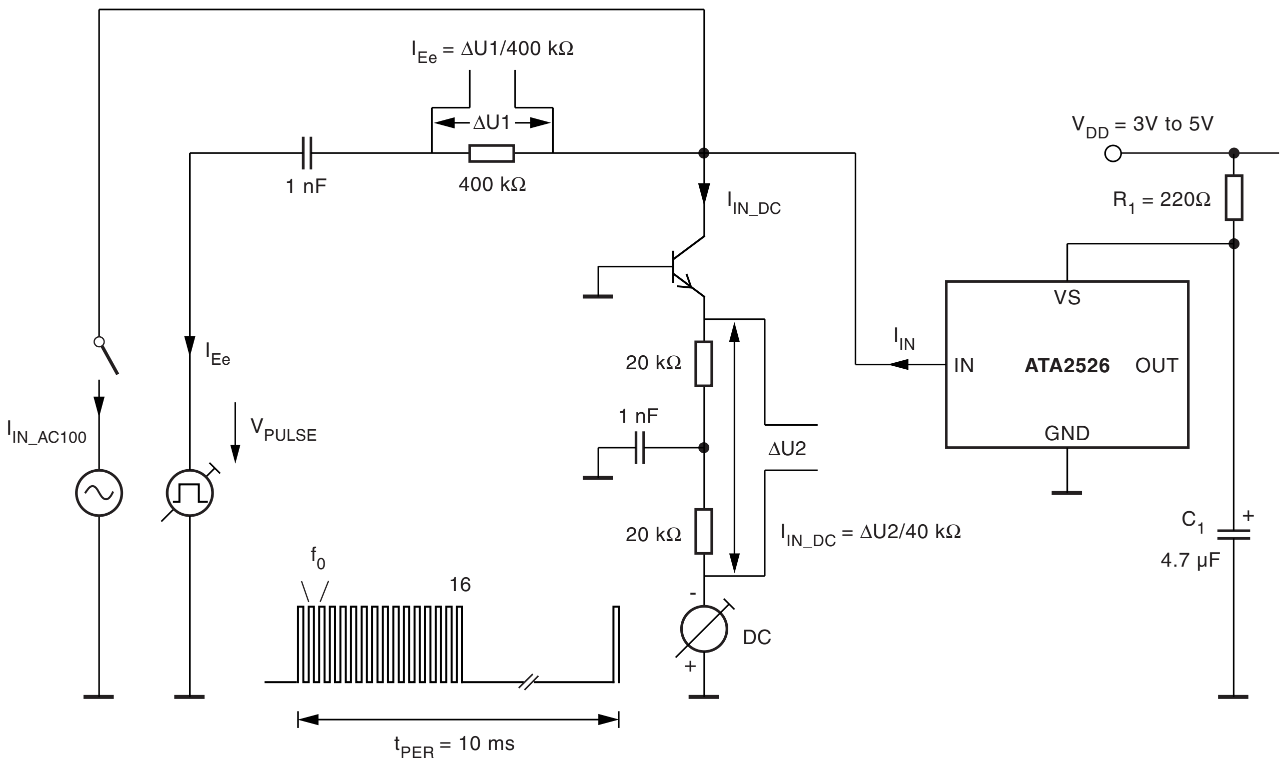
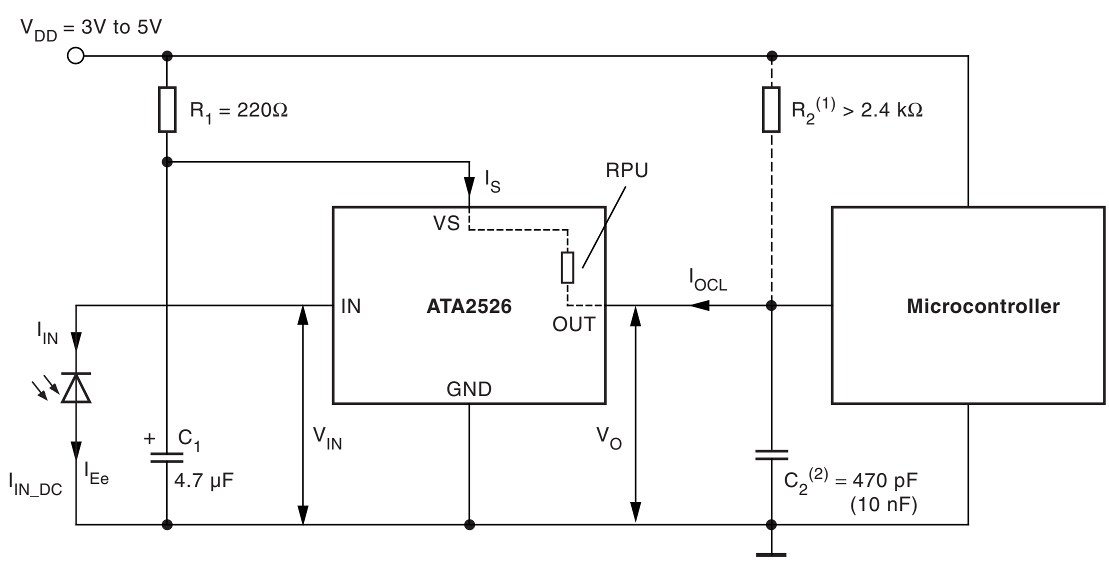


Figure 6-10. Application Circuit



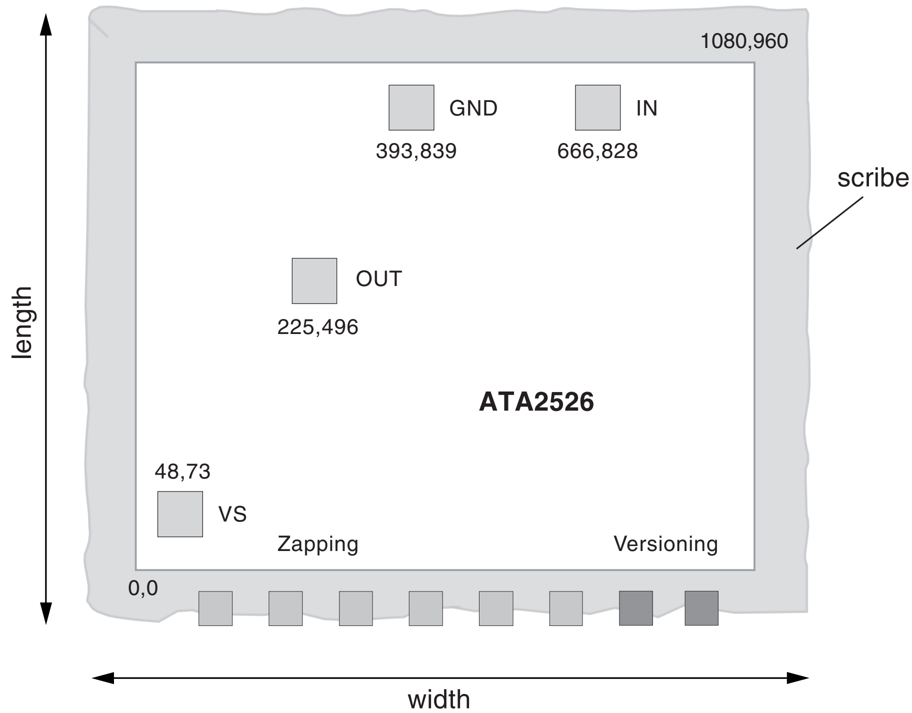
(1) Optional

(2) The value of C_2 is dimensioned for the short burst type ATA2526P7xx. For the other types C_2 can be omitted.

In case of an optional resistor R_2 > 2.4 kΩ the value of C_2 must be increased to C_2 = 10 nF. For the other types C_2 = 470 pF is sufficient.

7. Chip Dimensions

Figure 7-1. Chip Size in µm



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

Dimensions	Length inclusive scribe	1.04 mm
	Width inclusive scribe	1.20 mm
	Thickness	290 µ ± 5%
	Pads	80 µ × 80 µ
	Fusing pads	60 µ × 60 µ
Pad metallurgy	Material	AlCu/AlSiTi[(1)]
	Thickness	0.8 µm
Finish	Material	Si_3N_4/SiO_2
	Thickness	0.7/0.3 µm

Note: 1. Value depends on manufacture location.

8. Ordering Information

Delivery: unsawn wafers (DDW) in box

Extended Type Number	D[(2)]	Type
ATA2526P1xx[(1)]-DDW	2175	**Standard type:** ≥ 10 pulses, high data rate
ATA2526P3xx[(1)]-DDW	1400	**Lamp type:** ≥ 10 pulses, enhanced suppression of disturbances, secure data transmission
ATA2526P7xx[(1)]-DDW	3415	**Short burst type:** ≥ 6 pulses, highest data rate

Notes: 1. xx means carrier frequency value (33, 36, 37, 38 or 40 kHz and 56kHz)

2. Maximum data transmission rate up to bits/s with f_0 = 56kHz, V_S = 5V (see Figure 6-6 on page 8)

8.1 Pad Layout

Figure 8-1. Pad Layout

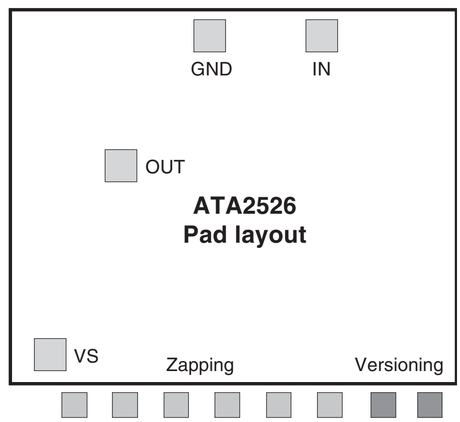


Table 8-1. Pin Description

SYMBOL	FUNCTION
OUT	Data output
VS	Supply voltage
GND	GND
IN	Input pin diode
Zapping	f_0 adjust
Versioning	type adjust

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
4905D-AUTO-10/06	• Features on page 1 changed • Applications on page 1 changed • Section 1 “Description” on page 1 changed • Section 2 “Pin Configuration” on page 2 changed • Number 2.2, 3.3 and 3.4 of Section 5 “Electrical Characteristics, 3-V Operation” on pages 3 to 4 changed • Number 73, 7.4 and 8.4 of Section 5 “Electrical Characteristics, 3-V Operation” on page 5 to 6 changed • Section 6.1 “ESD” on page 6 deleted • Figure 7-10 “Application Circuit” on page 10 changed • Section 9 “Ordering Information” on page 12 changed • Rename Figure 9-1 on page 12
4905C-AUTO-04/06	• Section 9 “Ordering Information” on page 12 changed
4905B-AUTO-04/06	• Put datasheet in a new template • Section 8 “Chip Dimensions” on page 11 changed

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