IR Receiver ASSP

ATA2525

Features

- **No External Components Except PIN Diode**
- **Supply-voltage Range: 4.5V to 5.5V**
- **High Sensitivity Due to Automatic Sensitivity Adaption (AGC) and Automatic Strong Signal Adaption (ATC)**
- **High Immunity Against Disturbances from Daylight and Lamps**
- **Small Size and Innovative Pad Layout**
- **Available for Carrier Frequencies between 33 kHz to 40 kHz; Adjusted by Zener Diode Fusing**
- **TTL and CMOS Compatible**
- **Suitable Minimum Burst Length ≥ 10 Pulses/Burst**

Applications

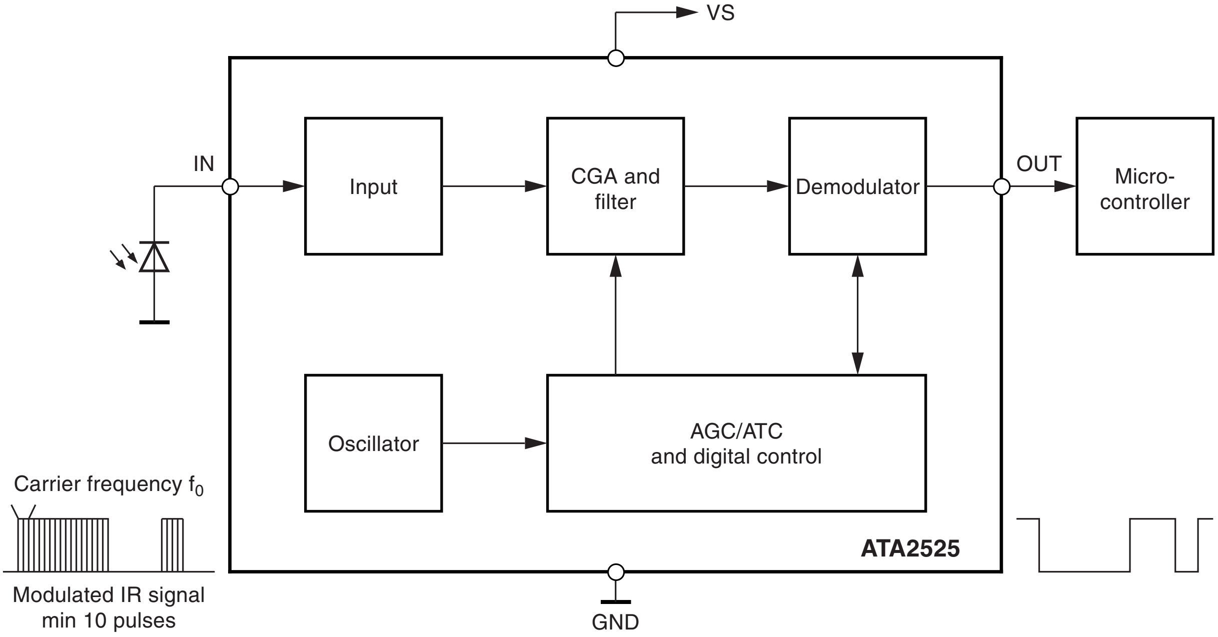
- **Home Entertainment Applications**
- **Home Appliances**
- **Remote Control Equipment**

1. Description

The IC ATA2525 is a complete IR receiver for data communication that was 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 ATA2525 is available with standard carrier frequencies (33, 36, 37, 38, 40 kHz) and 3 different noise suppression regulation types (standard, lamp, noise) covering requirements of different high-volume remote control solutions (please refer to selection guide available for ATA2525/ATA2526). The ATA2525 operates in a supply voltage range of 4.5V to 5.5V.

The function of ATA2525 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 **C**ontrolled **G**ain **A**mplifier (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.

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.

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°C	P_{tot}	30	mW

3. Electrical Characteristics

T_{amb} = –25°C to +85°C, V_S = 4.5V to 5.5V 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	T_{amb} = 25°C; see Figure 5-7 on page 8	R_{PU}		40		kΩ	A
2.2	Output voltage low	I_L = 2 mA; see Figure 5-7 on page 8	V_{OL}			250	mV	B
2.3	Output voltage high	T_{amb} = 25°C	V_{OH}	V_S – 0.25		V_S	V	A
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; see Figure 5-1 on page 5	V_{IN} = 0; V_s = 5V, T_{amb} = 25°C	I_{IN_DCMAX}	–530	–960		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

3. Electrical Characteristics (Continued)

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

No.	Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit	Type*
3.3	Minimum detection threshold current; see Figure 5-2 on page 5	Test signal: see Figure 5-6 on page 7 V_S = 5V, T_{amb} = 25°C, I_{IN_DC} = 1 µA; square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, see Figure 5-6 on page 7; BER = 50$^{(1)}$	I_{Eemin}		–600		pA	B
3.4	Minimum detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz	Test signal: see Figure 5-6 on page 7 V_S = 5V, T_{amb} = 25°C, I_{IN_DC} = 1 µA, square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, see Figure 5-6 on page 7; BER = 50%$^{(1)}$	I_{Eemin}		–850		pA	C
3.5	Maximum detection threshold current	Test signal: see Figure 5-6 on page 7 V_S = 5V, T_{amb} = 25°C, I_{IN_DC} = 1 µA; square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, see Figure 5-6 on page 7; BER = 5%$^{(1)}$	I_{Eemax}	–400			µA	D
4	**Controlled Amplifier and Filter**							
4.1	Maximum value of variable gain (CGA)	V_S = 5V, T_{amb} = 25°C	G_{VARMAX}		51		dB	D
4.2	Minimum value of variable gain (CGA)	V_S = 5V, T_{amb} = 25°C	G_{VARMIN}		–5		dB	D
4.3	Total internal amplification$^{(2)}$	V_S = 5V, T_{amb} = 25°C	G_{MAX}		71		dB	D
4.4	Center frequency fusing accuracy of bandpass	V_S = 5V, T_{amb} = 25°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	–3 dB; f_0 = 38 kHz; see Figure 5-4 on page 6	B		3.5		kHz	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. Reliability

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

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

Figure 5-1. V_{IN} versus I_{IN_DC}, V_S = 5V

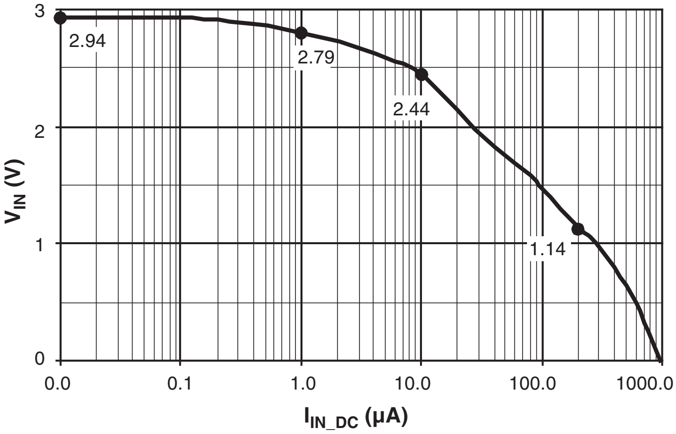


Figure 5-2. I_{Eemin} versus I_{IN_DC}, V_S = 5V

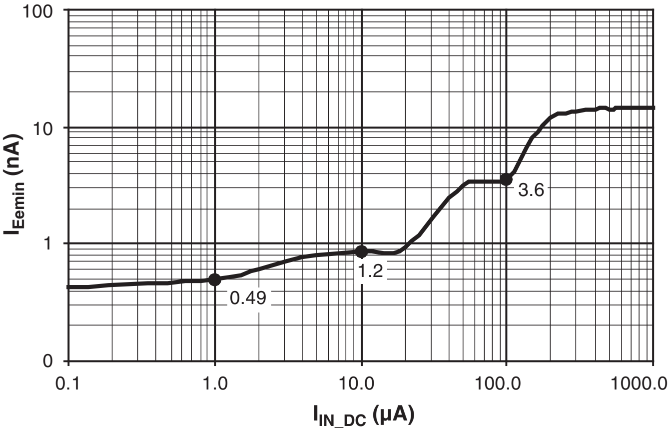


Figure 5-3. Data Transmission Rate, $V_S = 5V$

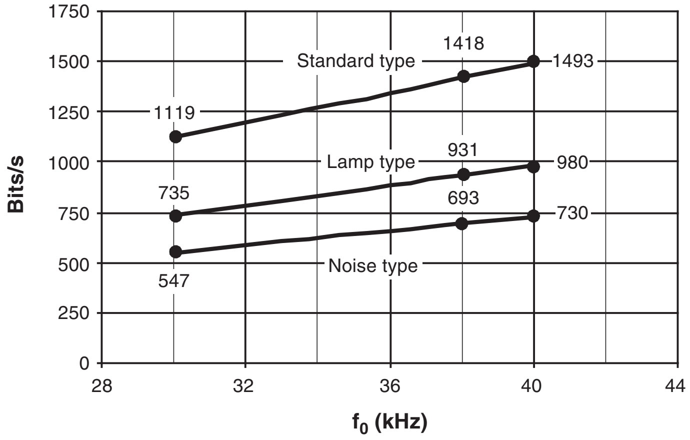
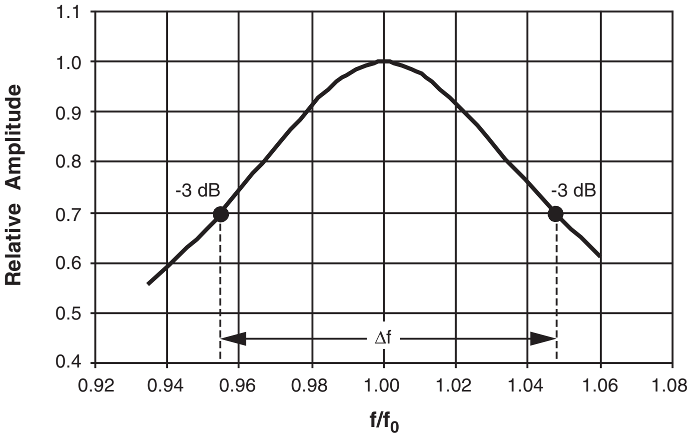
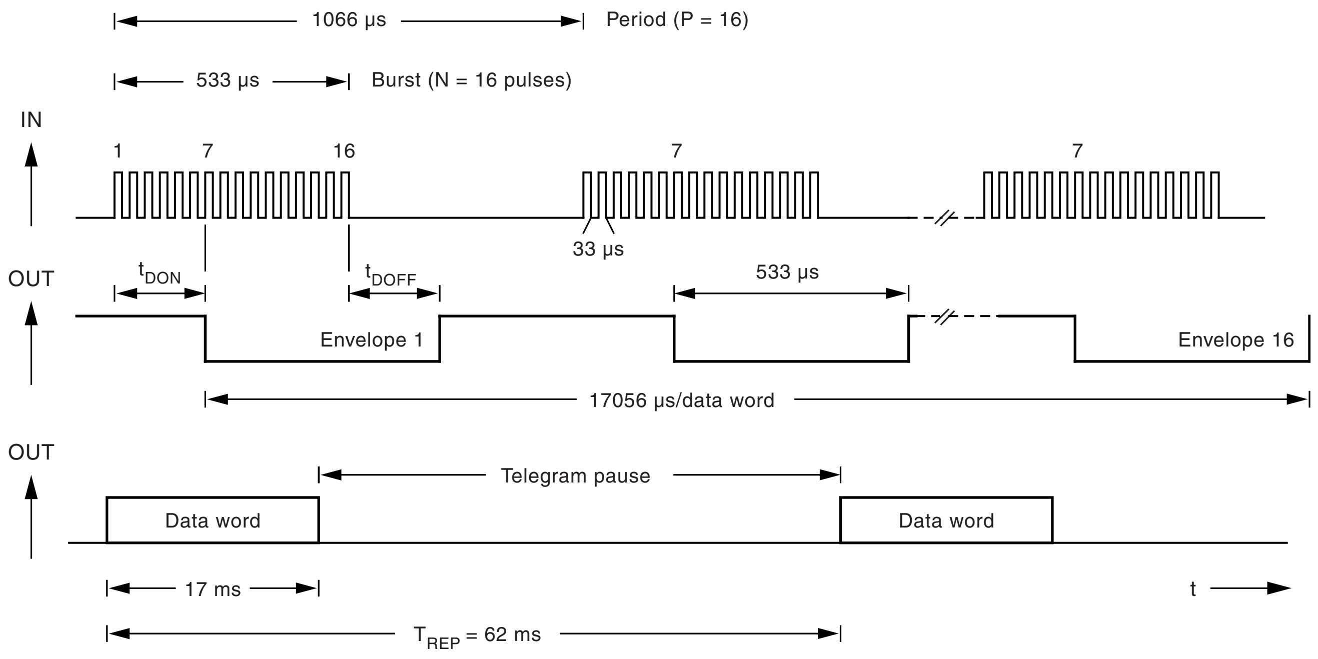


Figure 5-4. Typical Bandpass Curve



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

Figure 5-5. Illustration of Used Terms



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

Figure 5-6. Test Circuit

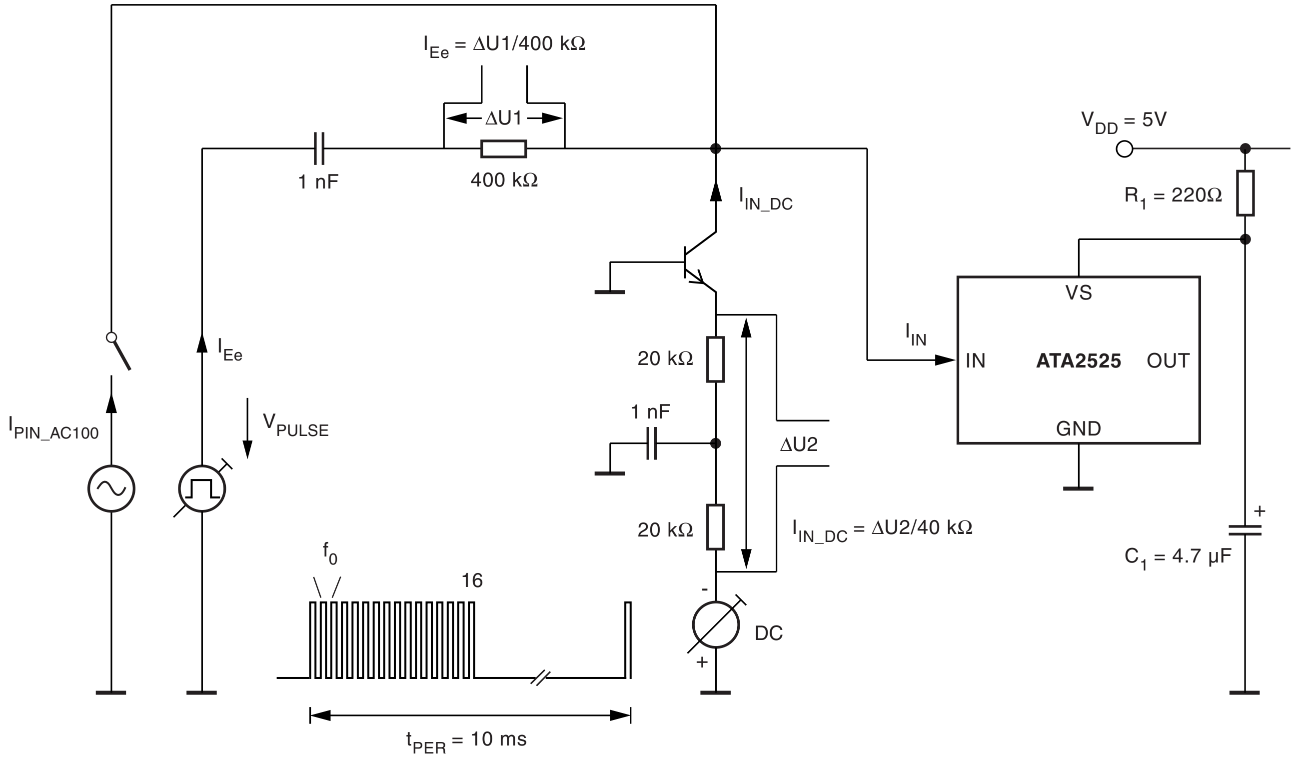
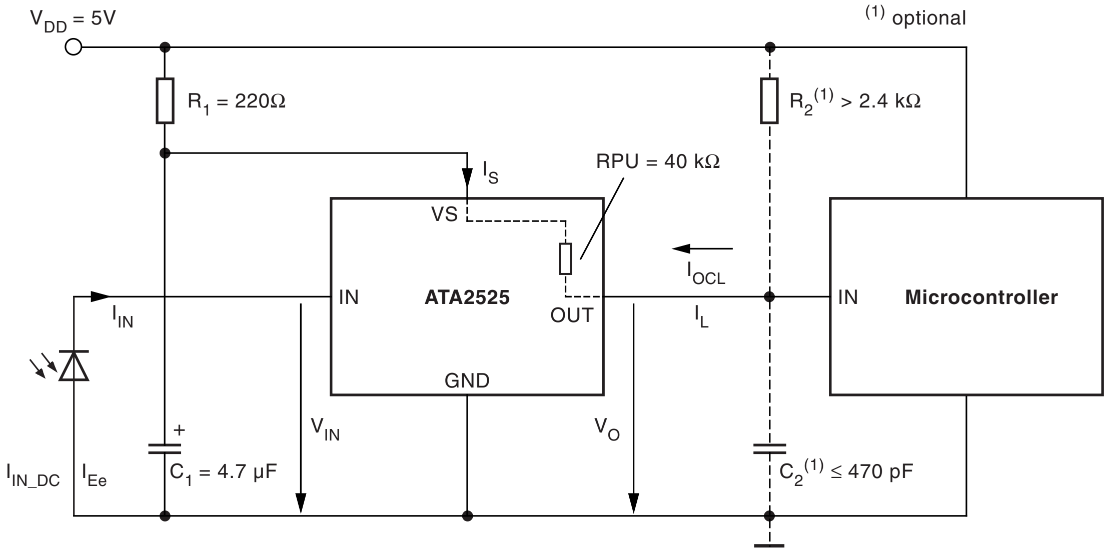
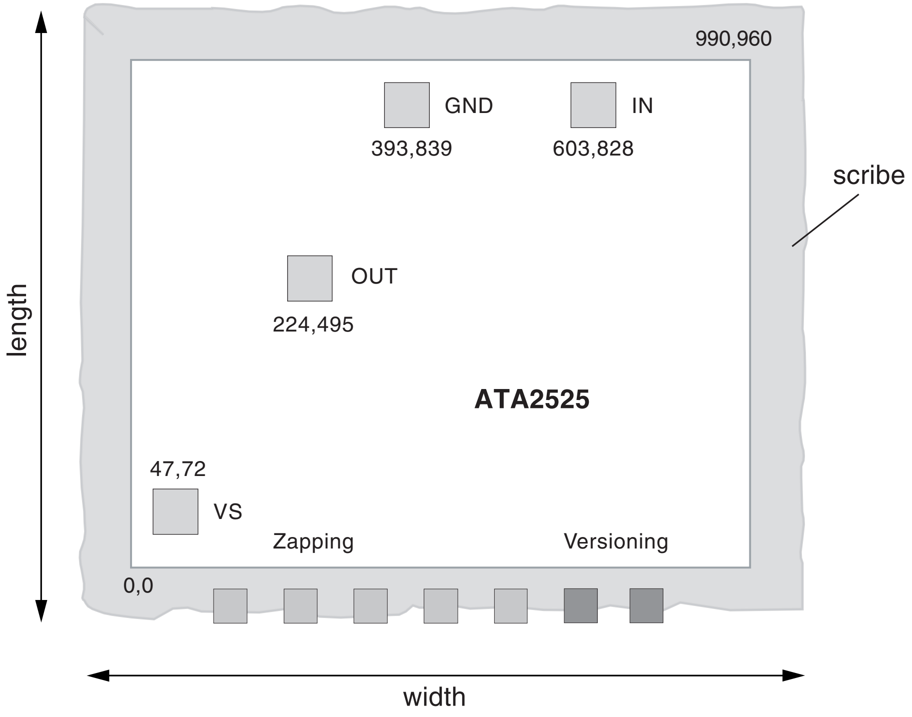


Figure 5-7. Application Circuit



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	1.04 mm
	Width inclusive scribe	1.11 mm
	Thickness	290µ ±5%
	Pads	80µ × 80µ
	Fusing pads	60µ × 60µ
Pad metallurgy	Material	AlCu/AlSiTi(1)
	Thickness	0.8 µm
Finish	Material	Si_3N_4/SiO_2(1)
	Thickness	0.7/0.3 µm

Note: 1. Value depends on manufacture location.

7. Ordering Information

Delivery: unsawn wafers (DDW) in box

Extended Type Number	D[2]	Type
ATA2525S1xx[1]C-DDW	1493	**Standard type:** high data rate
ATA2525S3xx[1]C-DDW	980	**Lamp type:** enhanced suppression of disturbances, secure data transmission
ATA2525S5xx[1]C-DDW	730	**Noise type:** best suppression of disturbances, low data rate

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

2. Maximum data transmission rate up to bits/s with f_0 = 40 kHz, V_S = 5V (see Figure 5-2 on page 5)

8. Pad Layout

Figure 8-1. Pad Layout

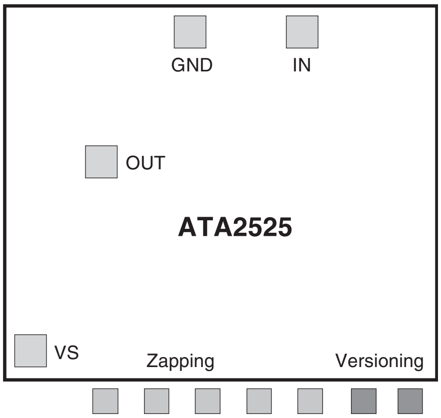


Table 8-1. Pin Description

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
4854G-AUTO-05/10	• Page 3: Thermal Resistance table deleted • Page 3 and 4: Pin column in Electrical Characteristics table deleted
4854F-AUTO-09/09	• Put datasheet in newest template • Ordering Information table changed
4854E-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 deleted • Section 4 “Electrical Characteristics” number 3.3 on page 4 changed • Section 4 “Electrical Characteristics” number 3.4 on page 4 changed • Section 6 “ESD” on page 5 deleted • Section 10 “Ordering Information” on page 10 changed
4854D-AUTO-04/06	• Put datasheet in a new template • Section 10 “Ordering Information” on page 10 changed

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