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 ± 2.5%
- TTL and CMOS compatible

Applications

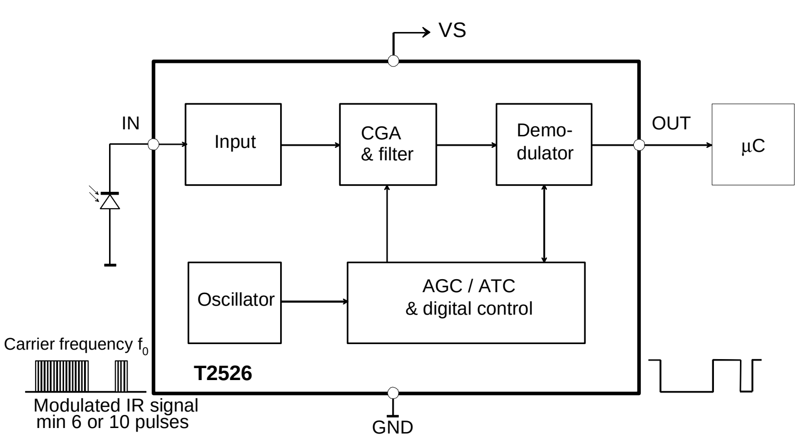
- Audio video applications
- Home appliances
- Remote control equipment

Description

The IC T2526 is a complete IR receiver for data communication developed and optimised for use in carrier frequency modulated transmission applications. It's 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 optimised for low noise application. 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 choosen 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 enviromental 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 optimised for best performance within 2.7 V to 3.3 V.

Block Diagram

Figure 1.



Low-Voltage IR Receiver ASSP

T2526

Rev. A4, 13-Nov-01

Ordering Information

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

Extended Type Number	PL[2)]	R_{PU}[3)]	D[4)]	Type
T2526N0xx[1)]-yyy[5)]	2	30	2179	**Standard type:** ≥10 pulses, enhanced sensibility, high data rate
T2526N1xx[1)]-DDW	1	30	2179	
T2526N2xx[1)]-yyy[5]	2	40	1404	**Lamp type:** ≥10 pulses, enhanced suppression of disturbances, secure data transmission
T2526N3xx[1)]-DDW	1	40	1404	
T2526N6xx[1)]-yyy[5]	2	30	3415	**Short burst type:** ≥6 pulses, enhanced data rate
T2526N7xx[1)]-DDW	1	30	3415	

Notes:
1. xx means the used carrier frequency value f_0 30, 33, 36, 38, 40, 44 or 56 kHz.(76 kHz type on request)
2. Two pad layout versions (see figures 2 and 3) available for different assembly demand
3. Integrated pull-up resistor at PIN OUT (see electrical characteristics)
4. Typical data transmission rate up to bit/s with f_0 = 56 kHz, V_S = 5 V (see figure 10)
5. yyy means kind of packaging:
   ....DDW -> unsawn wafers in box
   ....TAS -> SO8 in stick
   ....TAQ -> SO8 taped and reeled
   ....6AQ -> (on request, not standard; TSSOP8 taped 1and reeled)

Samples in SO8 package are available as T2526N038, T2526N238 and T2526N638.

Pad Layout

Figure 2. Pad layout 1 (DDW only)

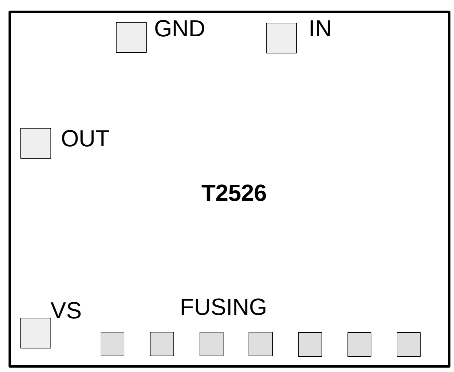
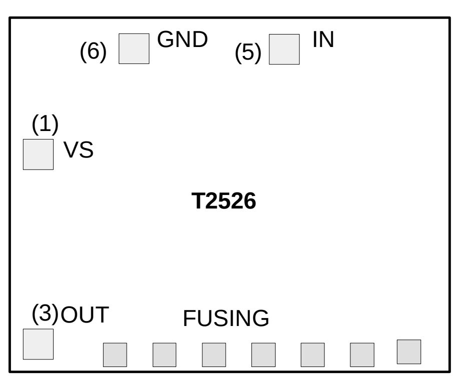
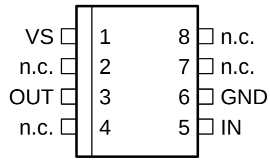


Figure 3. Pad layout 2 (DDW, SO8 or TSSOP8)



Pin Configuration

Figure 4. Pinning SO8 and TSSOP8



Pin Description

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

Absolute Maximum Ratings

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 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°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 to 85°C, V_S = 2.7 to 3.3 V 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	1.2	mA	B
2	**Output**								
2.1	Internal pull-up resistor [1)]	T_{amb} = 25°C; see figure 14	1, 3	R_{PU}		30/40		kΩ	A
2.2	Output voltage low	R_2 = 2.4 kΩ; see figure 14	3, 6	V_{OL}			250	mV	B
2.3	Output voltage high		3, 1	V_{OH}	V_S-0.25		Vs	V	B
2.4	Output current clamping	R_2 = 0; see figure 14	3, 6	I_{OCL}		8		mA	B
3	**Input**								
3.1	Input DC current	V_{IN} = 0; see figure 14	5	I_{IN_DCMAX}	-150			µA	C
3.2	Input DC current; see figure 7	V_{IN} = 0; Vs = 3 V, T_{amb} = 25°C	5	I_{IN_DCMAX}		-350		µA	B
3.3	Min. detection threshold current; see figure 5	Test signal: see figure 13 V_S = 3V, T_{amb}= 25°C, I_{IN_DC}=1µA; square pp, burst N=16, f=f_0; t_{PER} = 10 ms, fig. 12; BER = 50[2)]	3	I_{Eemin}		-700		pA	B
3.4	Min. detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz		3	I_{Eemin}		-1500		pA	C
3.5	Max. detection threshold current with V_{IN} > 0V	Test signal: see figure 13 V_S = 3 V, T_{amb} = 25°C, I_{IN_DC} = 1µA; square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, fig. 12; BER=5%[2)]	3	I_{Eemax}	-200			µA	D
4	**Controlled Amplifier and Filter**								
4.1	Max. value of variable gain (CGA)			G_{VARMAX}		51		dB	D
4.2	Min. value of variable gain (CGA)			G_{VARMIN}		-5		dB	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

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
4.3	Total internal amplification[3)]			G_{MAX}		71		dB	D
4.4	Center frequency fusing accuracy of bandpass	V_S = 3 V, 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	-3dB; f_0 = 38 kHz; see figure 11		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 to 85°C, V_S = 2.7 to 3.3 V 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	1.5	mA	B
6	**Output**								
6.1	Internal pull-up resistor [1)]	T_{amb} = 25°C; see figure 14	1,3	R_{PU}		30/40		kΩ	A
6.2	Output voltage low	R_2 = 2.4 kΩ; see figure 14	3,6	V_{OL}			250	mV	B
6.3	Output voltage high		3,1	V_{OH}	V_S- 0.25		Vs	V	B
6.4	Output current clamping	R_2 = 0; see figure 14	3,6	I_{OCL}		8		mA	B
7	**Input**								
7.1	Input DC current	V_{IN} = 0; see figure 14	5	I_{IN_DCMAX}	-400			µA	C
7.2	Input DC-current; see figure 8	V_{IN} = 0; Vs = 5 V, T_{amb} = 25°C	5	I_{IN_DCMAX}		-700		µA	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

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

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
7.3	Min. detection threshold current; see figure 6	Test signal: see figure 13 V_S = 5 V, T_{amb}= 25°C, I_{IN_DC}=1µA; square pp, burst N=16, f=f_0; t_{PER} = 10 ms, fig. 12; BER = 50[2]	3	I_{Eemin}		-890		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 13 V_S = 5 V, T_{amb} = 25°C, I_{IN_DC} = 1µA; square pp, burst N = 16, f = f_0; t_{PER} = 10 ms, fig. 12; BER=5%[2]	3	I_{Eemax}	-500			µA	D
8	**Controlled Amplifier and Filter**								
8.1	Max. value of variable gain (CGA)			G_{VARMAX}		51		dB	D
8.2	Min. value of variable gain (CGA)			G_{VARMIN}		-5		dB	D
8.3	Total internal amplification[3]			G_{MAX}		71		dB	D
8.4	Resulting center frequency fusing accuracy	f_0 fused at V_S = 3 V V_S = 5 V, T_{amb} = 25°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 ⇒ 2000V HBM; 200V MM, MIL-STD-883C, Method 3015.7

Reliability

Electrical qualification (1000h) in molded S08 plastic package

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

Figure 5. I_{Eemin} vs. I_{IN_DC} , V_S = 3V

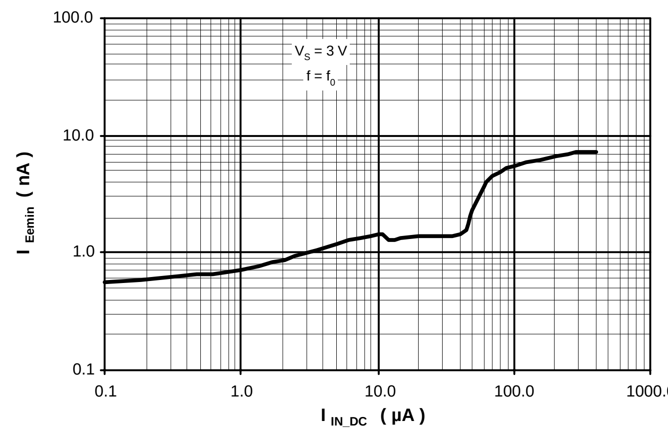


Figure 6. I_{Eemin} vs. I_{IN_DC} , V_S = 5 V

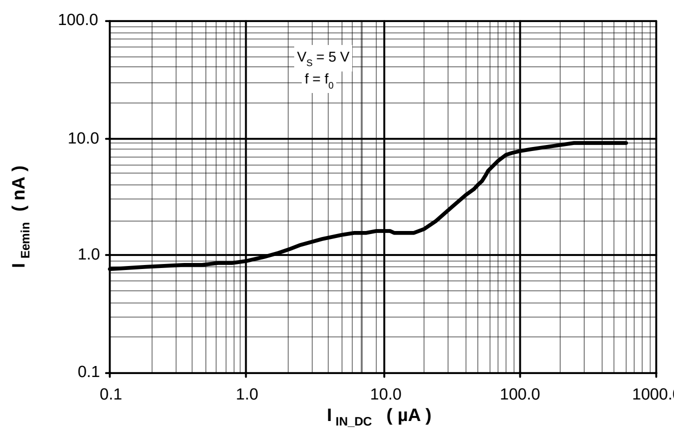


Figure 7. V_{IN} vs. I_{IN_DC}, V_S = 3 V

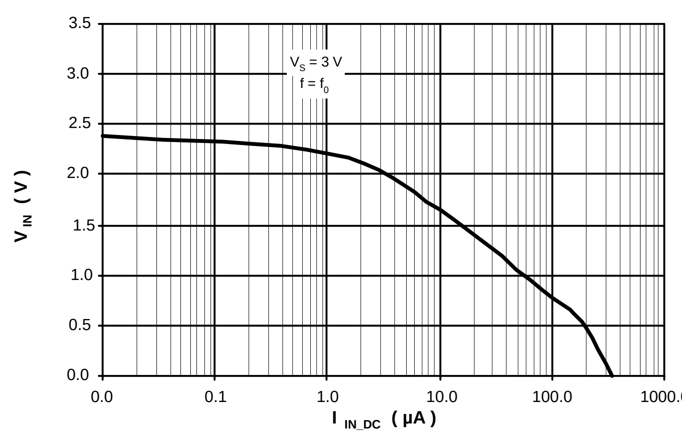


Figure 8. V_{IN} vs. I_{IN_DC}, V_S = 5 V

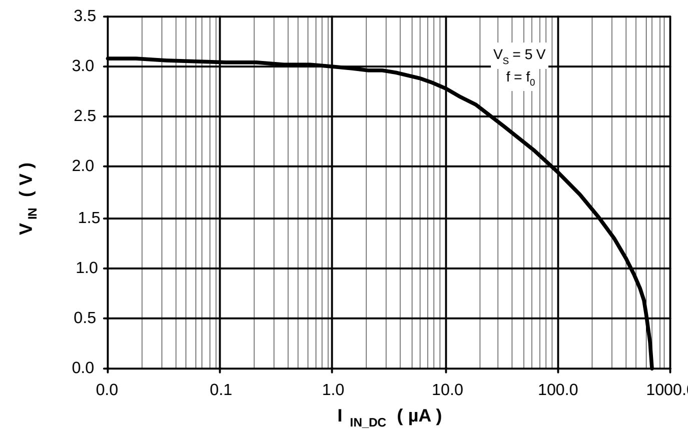


Figure 9. Data transmission rate, V_S = 3 V

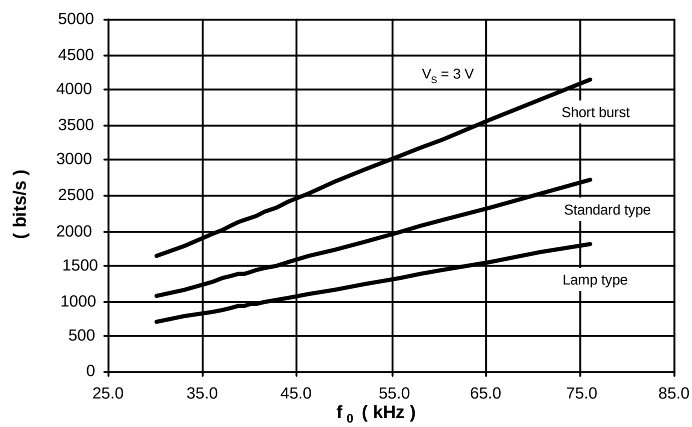


Figure 10. Data transmission rate, V_S = 5 V

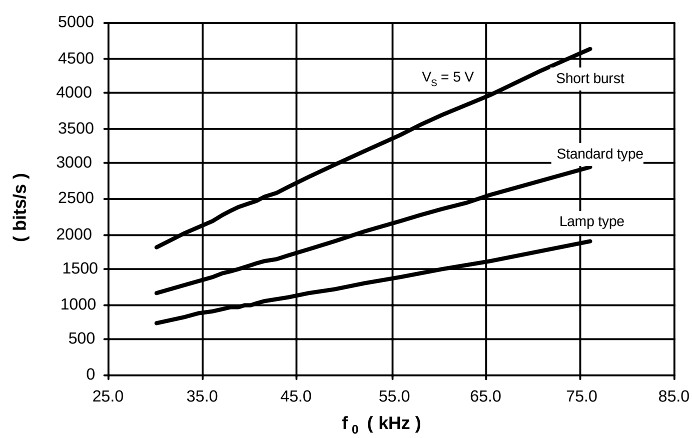
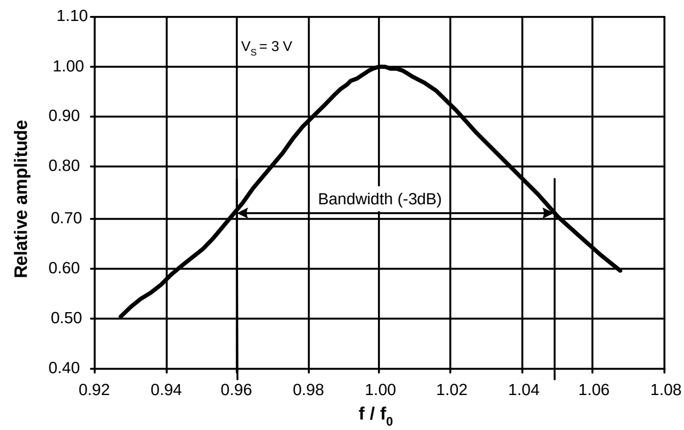


Figure 11. Typical bandpass curve

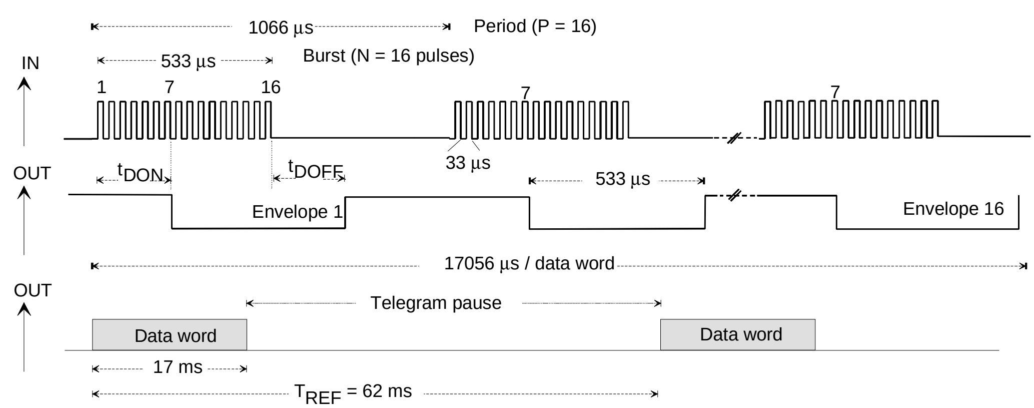


$Q = f/f_0 / B$; B => -3dB values.

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

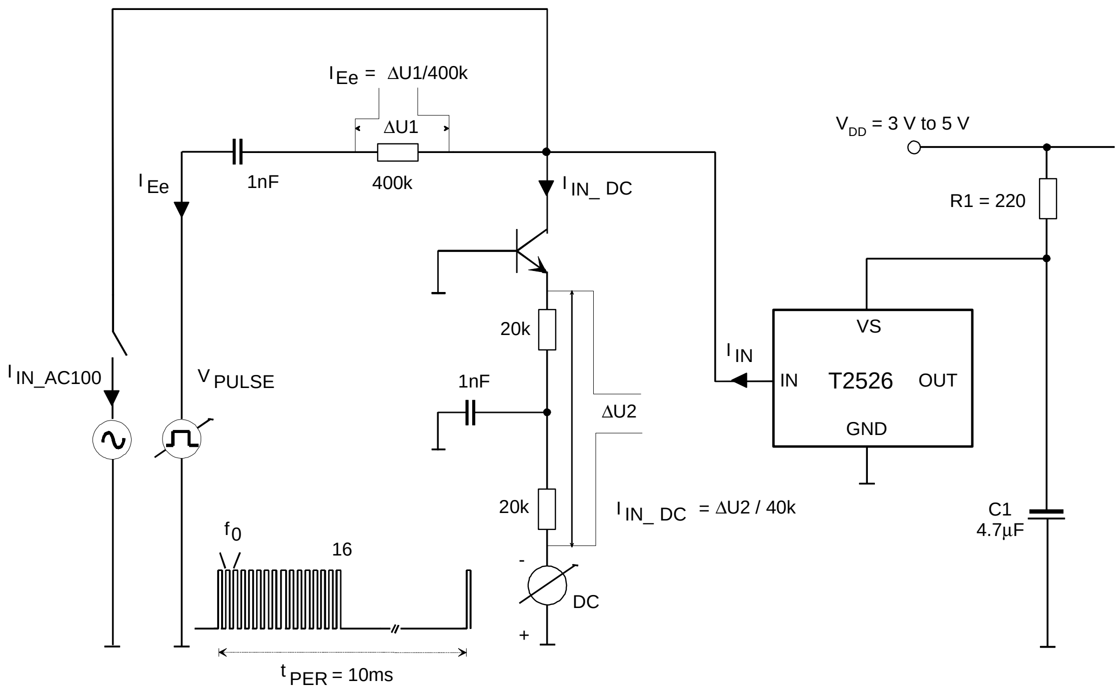
Figure 12. Illustration of used terms

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



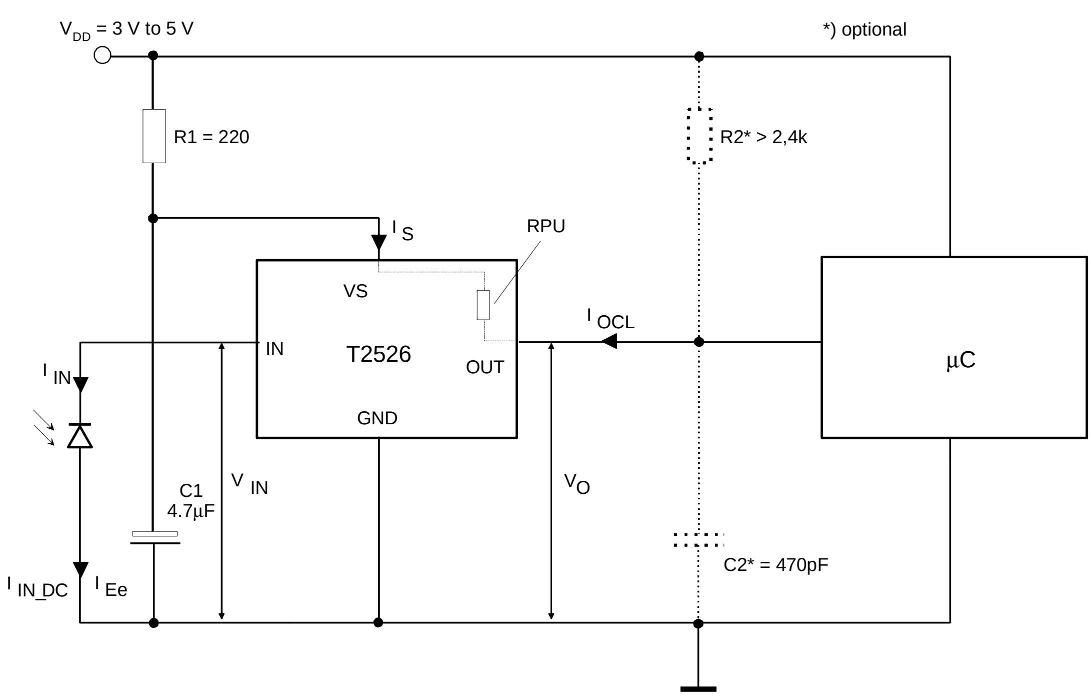
Test Circuit

Figure 13.



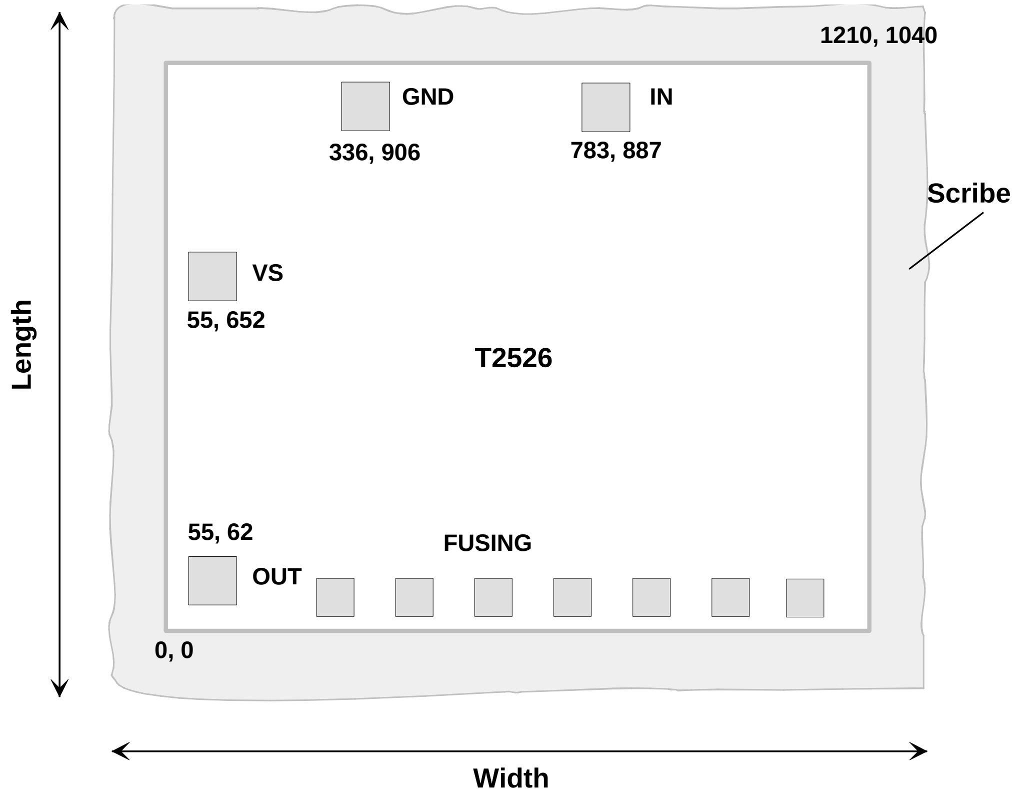
Application Circuit

Figure 14.



Chip Dimensions

Figure 15. 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 incl. scribe	1.16 mm
	Width incl. scribe	1.37 mm
	Thickness	290 µ ± 5%
	Pads	90 µ x 90 µ
	Fusing pads	70 µ x 70 µ
Pad metallurgy	AlSiTi	
Finish	Si_3N_4 thickness 1.05 µm	

Package Information

Figure 16.

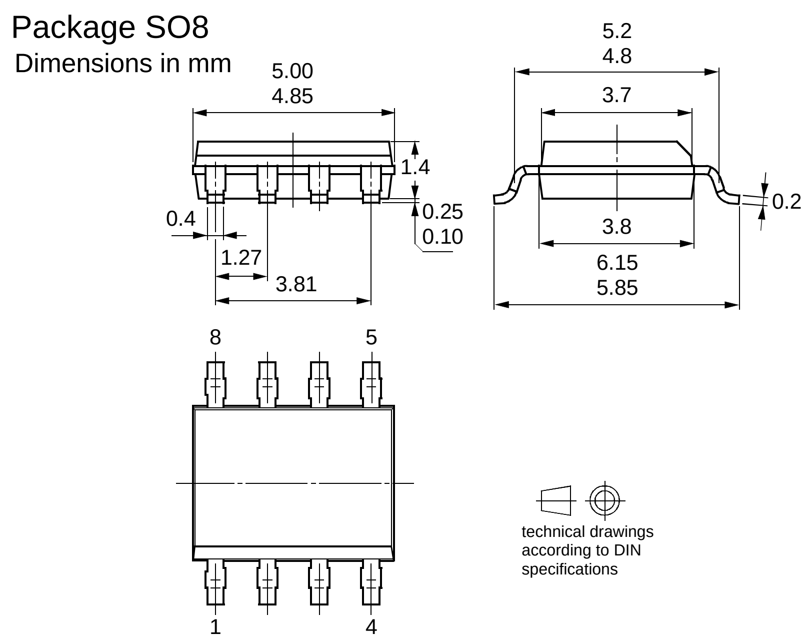
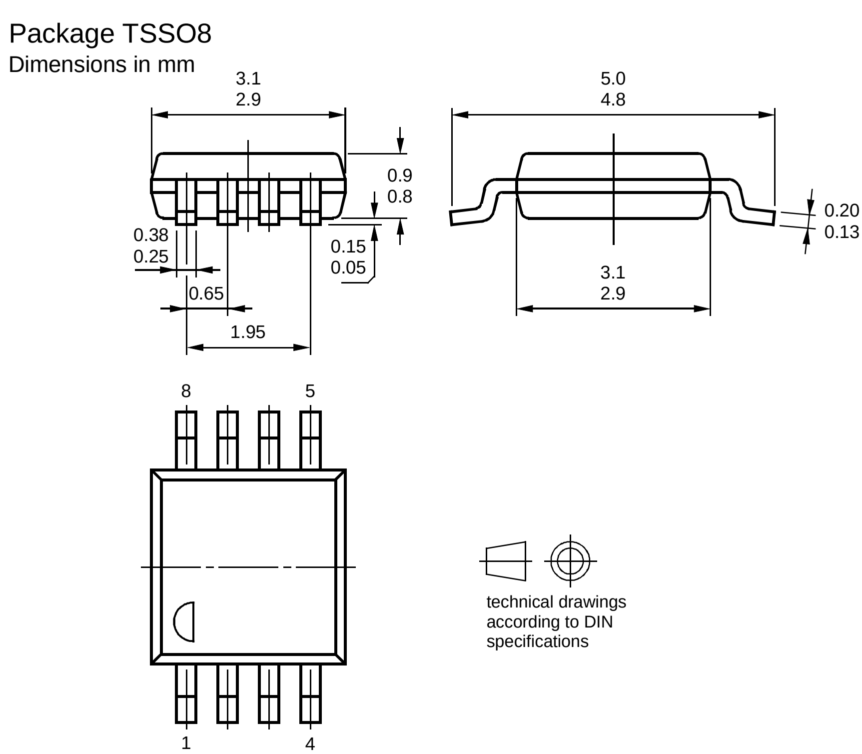


Figure 17.



Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Atmel Germany GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Atmel Germany GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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Rev. A4, 13-Nov-01