Features

- **No external components except PIN diode**
- **Supply-voltage range: 4.5 V to 5.5 V**
- **Automatic sensitivity adaptation (AGC)**
- **Automatic strong signal adaptation (ATC)**
- **Enhanced immunity against ambient light disturbances**
- **Available for carrier frequencies between 30 kHz to 76 kHz; adjusted by Zener diode fusing**
- **TTL and CMOS compatible**
- **Suitable min. burst length ≥ 6 or 10 pulses/burst**

Applications

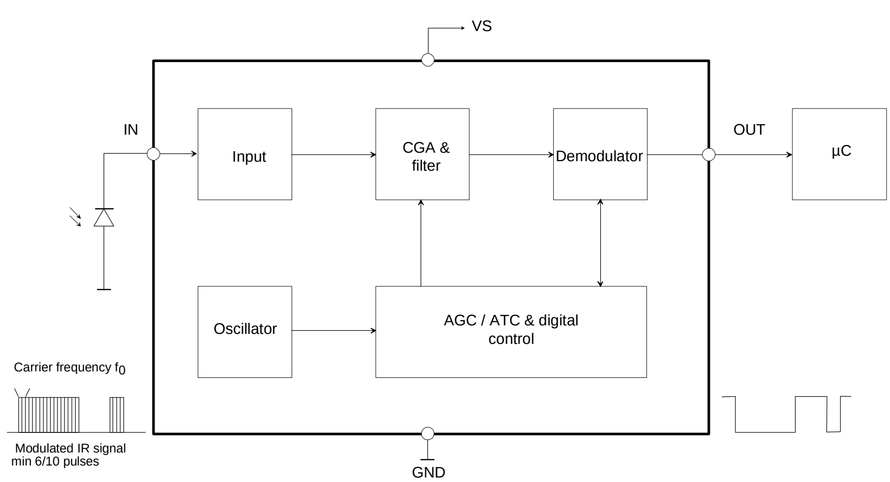
- **Audio video applications**
- **Home appliances**
- **Remote control equipment**

Description

The IC T2525 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 (see 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 **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. The T2525 operates in a supply-voltage range of 4.5 V to 5.5 V.

Block Diagram

Figure 1.



IR Receiver ASSP

T2525

Rev. A3, 17-Oct-01

Ordering Information

Extended Type Number	PL 2)	R_{PU} 3)	D 4)	Type
T2525N0xx 1)-yyy 5)	2	30	2090	**Standard type:** ≥10 pulses, enhanced sensibility, high data rate
T2525N1xx 1)-DDW	1	30	2090	**Standard type:** ≥10 pulses, enhanced sensibility, high data rate
T2525N2xx 1)-yyy 5	2	40	1373	**Lamp type:** ≥10 pulses, enhanced suppression of disturbances, secure data transmission
T2525N3xx 1)-DDW	1	40	1373	**Lamp type:** ≥10 pulses, enhanced suppression of disturbances, secure data transmission
T2525N6xx 1)-yyy 5	2	30	3415	**Short burst type:** ≥6 pulses, enhanced data rate
T2525N7xx 1)-DDW	1	30	3415	**Short burst type:** ≥6 pulses, enhanced data rate

Notes:
1. xx means the used carrier frequency value f_0 30,33,36,38,40,44 ,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 7)
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 T2525N038, T2525N238 and T2525N638.

Pad Layout

Figure 2. Pad layout 1 (DDW only)

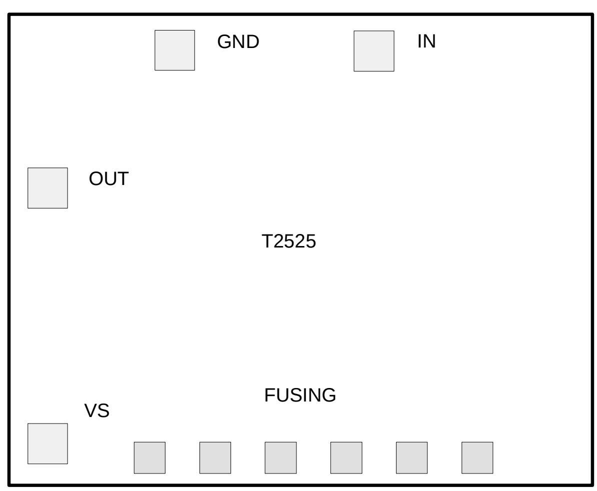
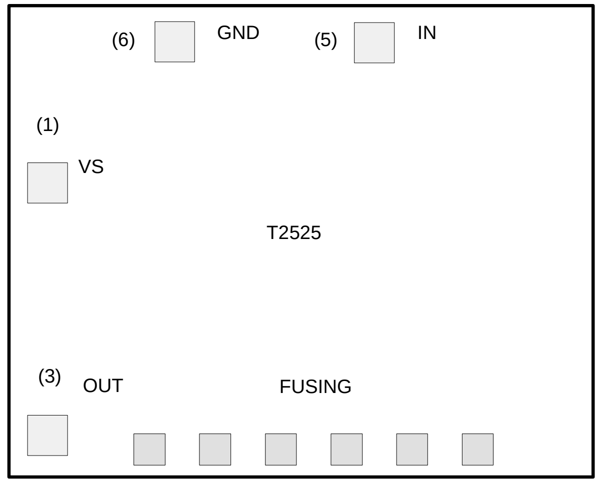


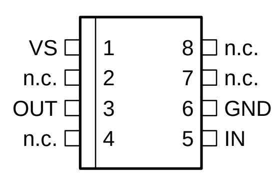
Figure 3. Pad layout 2 (DDW, SO8 or TSSOP8)



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

Figure 4. Pinning SO8 and TSSOP8



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 voltageV_O-0.3 to V_SV	V_O	-0.3 to V_S	V
Output current	I_O		mA
Operating temperature	T_{amb}		°C
Storage temperature	T_{stg}		°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

Tamb = -25 to 85°C, VS = 4.5 to 5.5 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	4.5	5	5.5	V	C
1.2	Supply current	I_{IN} =0	1	I_S	0.8	1.1	1.3	mA	B
2	**Output**								
2.1	Internal pull-up resistor [1)]	T_{amb} = 25°C; see figure 11	1,3	R_{PU}		30/40		kΩ	A
2.2	Output voltage low	I_L = 2 mA; see figure 11	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 11	3,6	I_{OCL}		8		mA	B
3	**Input**								
3.1	Input DC current	V_{IN} = 0; see figure 11	5	I_{IN_DCMAX}	-85			µA	C
3.2	Input DC-current; see figure 6	V_{IN} = 0; Vs = 5V, T_{amb} = 25°C	5	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. 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

Tamb = -25 to 85°C, VS = 4.5 to 5.5 V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.3	Min. detection threshold current; see figure 5	Test signal: see figure 10 V_S = 5 V, T_{amb}= 25°C, I_{IN_DC}=1µA; square pp, burst N=16, f=f_0; t_{PER} = 10ms, Fig. 10; BER = 50[2)]	3	I_{Eemin}		-520		pA	B
3.4	Min. detection threshold current with AC current disturbance IIN_AC100 = 3 µA at 100 Hz	Test signal: see figure 10 VS = 5 V, T_{amb} = 25°C, I_{IN_DC} = 1µA, square pp, burst N = 16, f = f0; t_{PER} = 10 ms, Fig. 10; BER = 50%[2)]	3	I_{Eemin}		-800		pA	C
3.5	Max. detection threshold current with V_{IN} > 0V	Test signal: see figure 10 V_S = 5V, T_{amb} = 25°C, I_{IN_DC} = 1µA; square pp, burst N = 16, f = f_0; t_{PER} = 10ms, Fig. 10; BER=5%[2)]	3	I_{Eemax}	-400			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
4.3	Total internal amplification[3)]			G_{MAX}		71		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

Tamb = -25 to 85°C, VS = 4.5 to 5.5 V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
4.4	Center frequency fusing accuracy of bandpass	V_S = 5 V, 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: type N0 - N3	-3dB; f_0 = 38 kHz; see fig 8		B		3.5		kHz	C
	BPF bandwidth: type N6, N7	-3dB; f_0 = 38 kHz		B		5.4		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

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 = 5 V

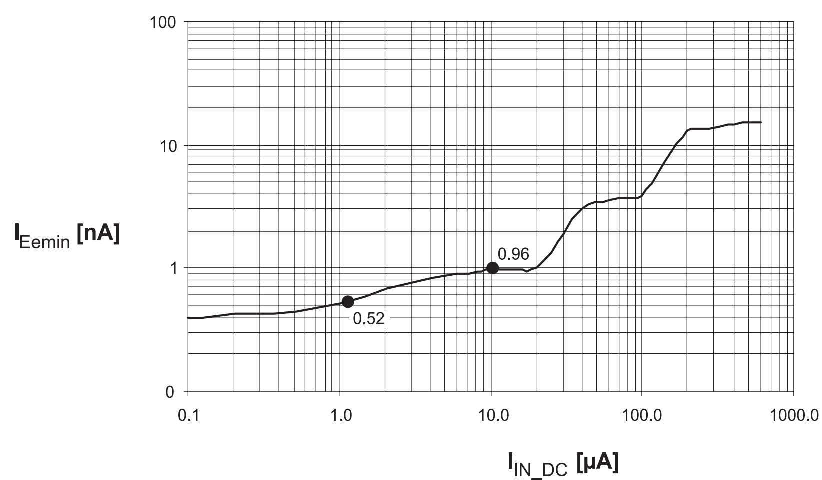


Figure 6. V_{IN} vs. I_{IN_DC}, V_S = 5 V

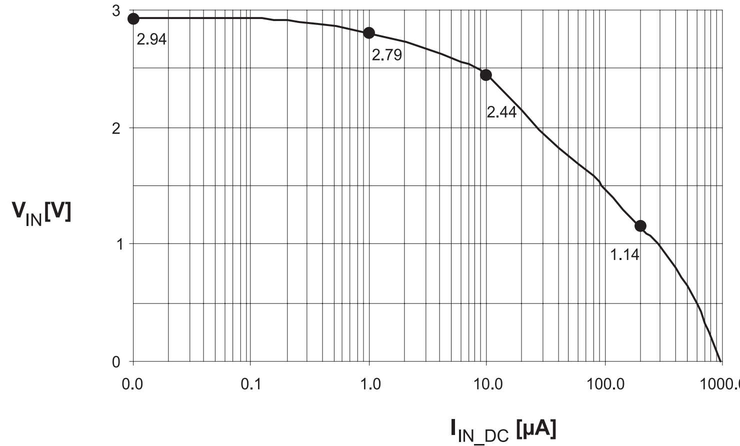


Figure 7. Data transmission rate, V_S = 5 V

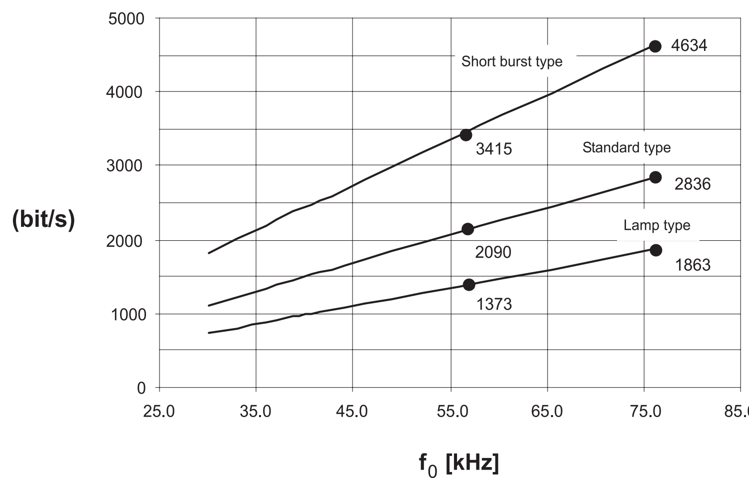
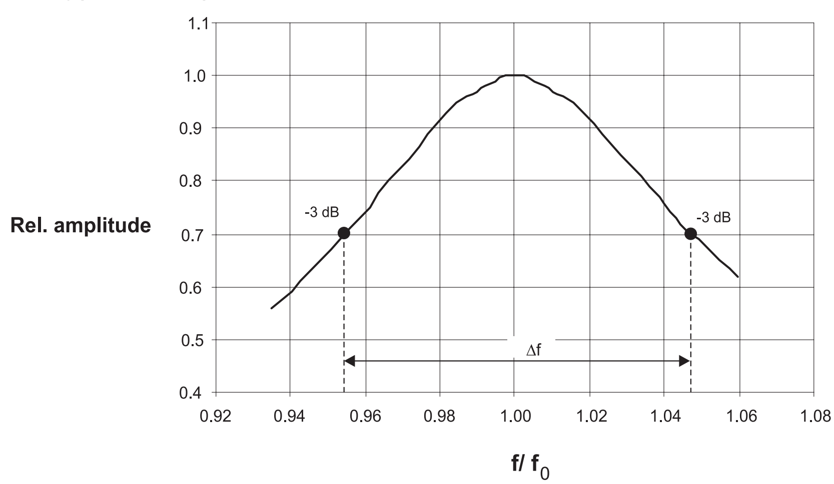
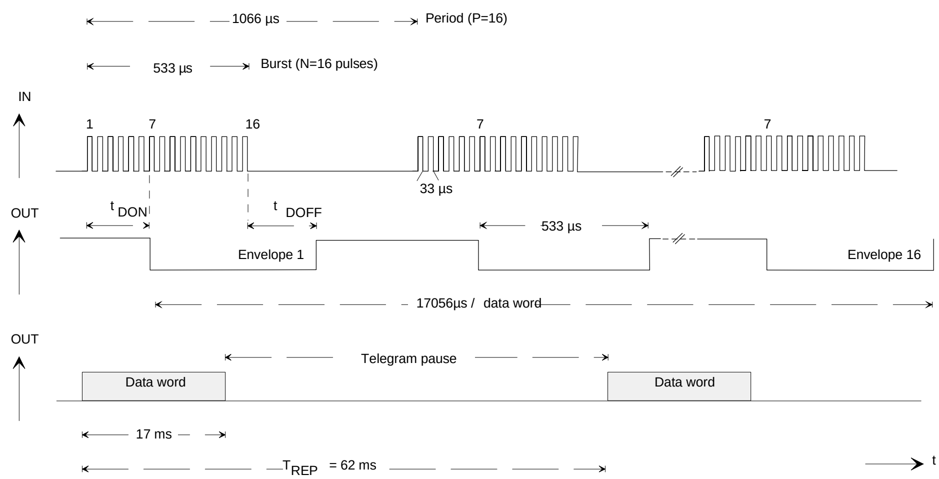


Figure 8. Typical bandpass curve



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

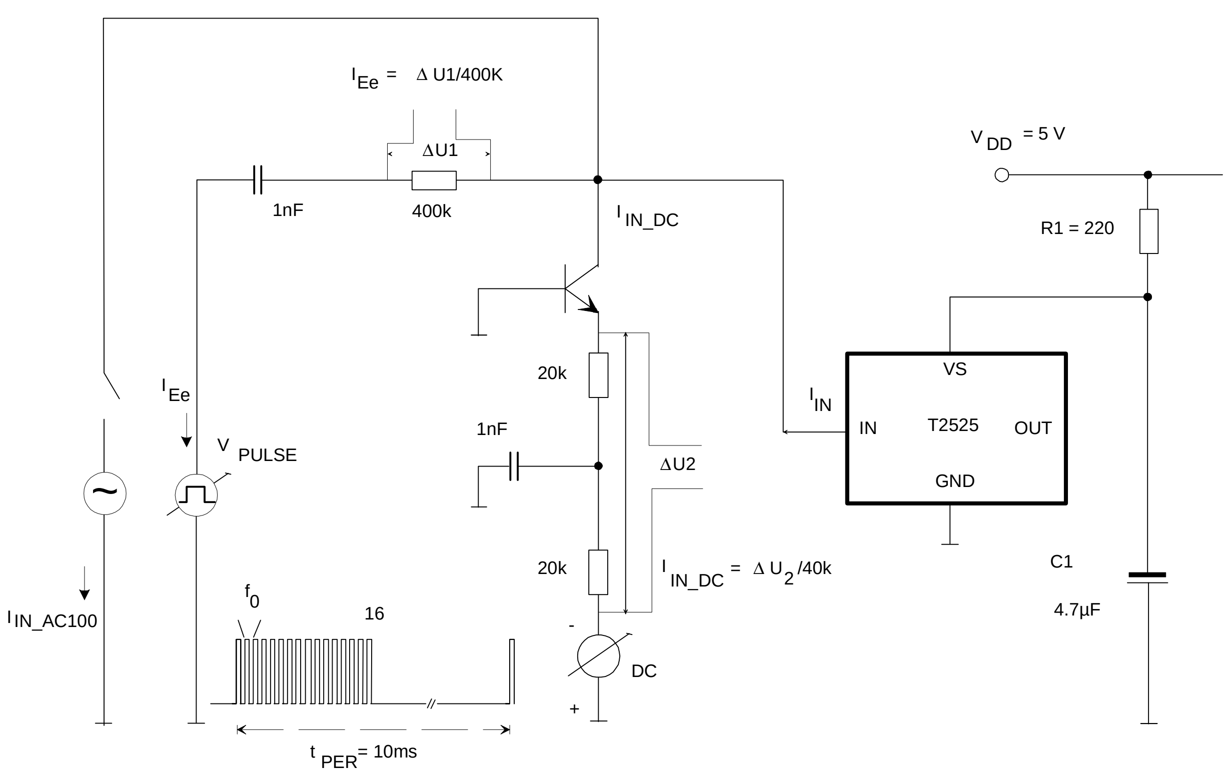
Figure 9. Illustration of used terms



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

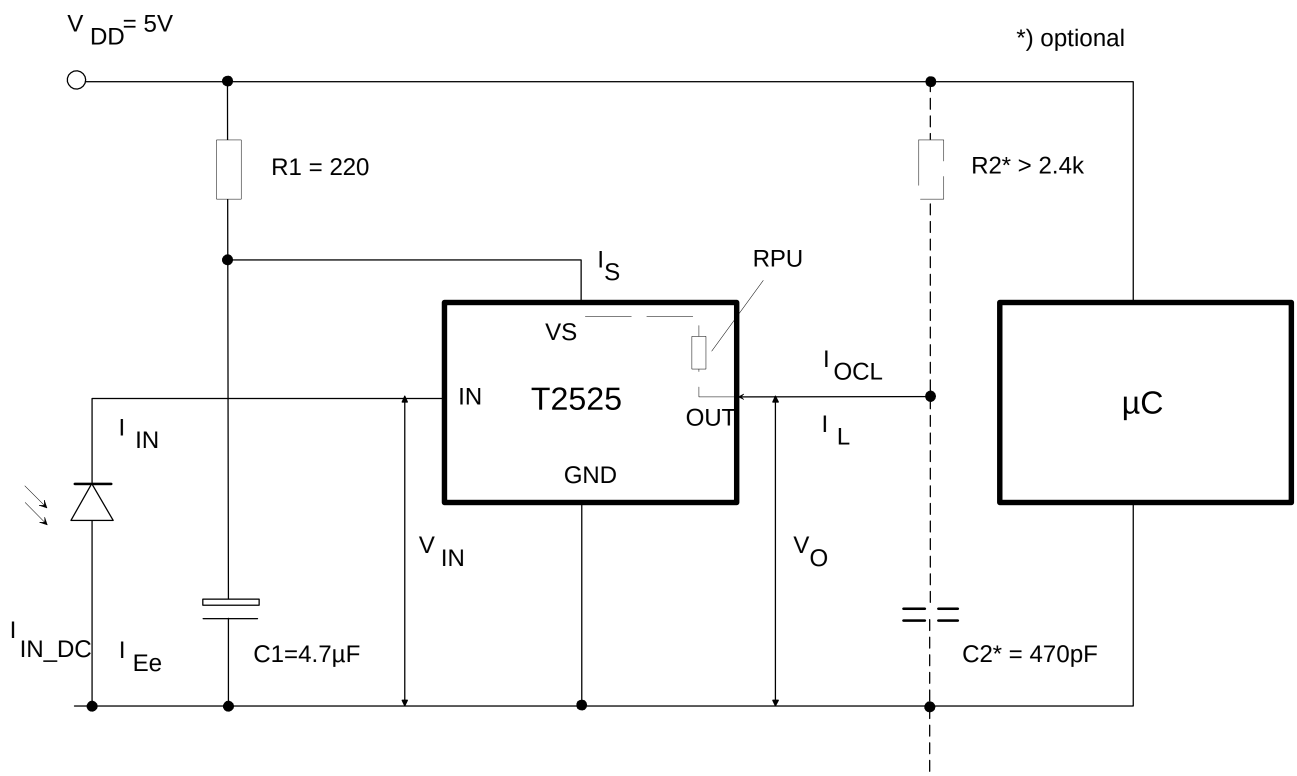
Test Circuit

Figure 10.



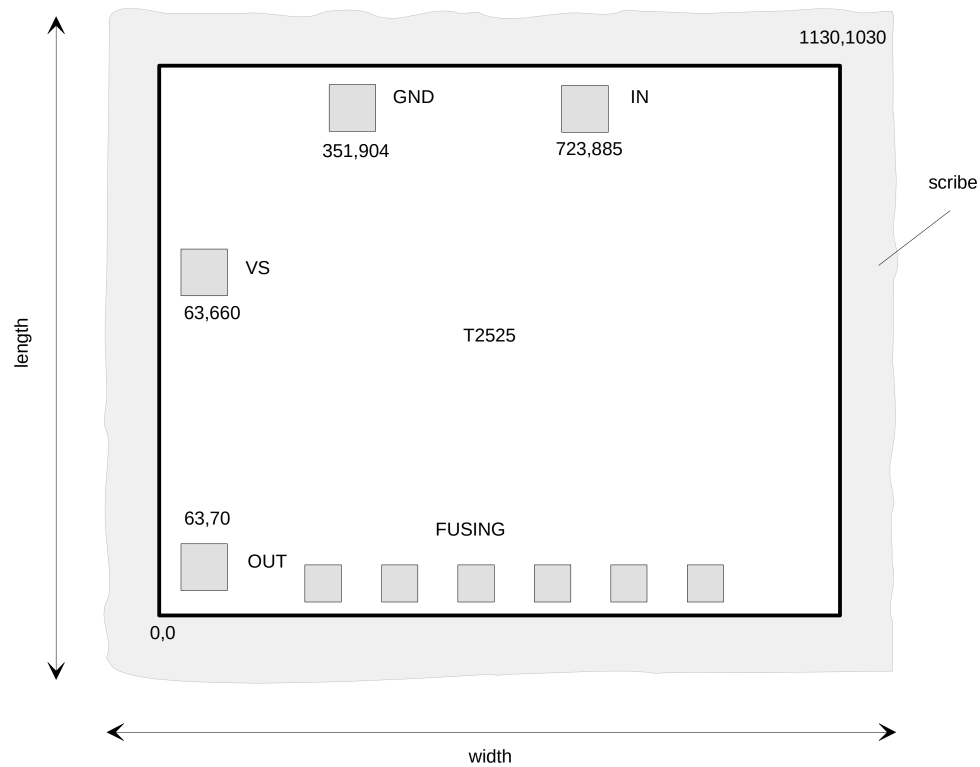
Application Circuit

Figure 11.



Chip Dimensions

Figure 12. Chip size in µm



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

Dimensions	Length incl. scribe	1.15 mm
	Width incl. scribe	1.29 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 13.

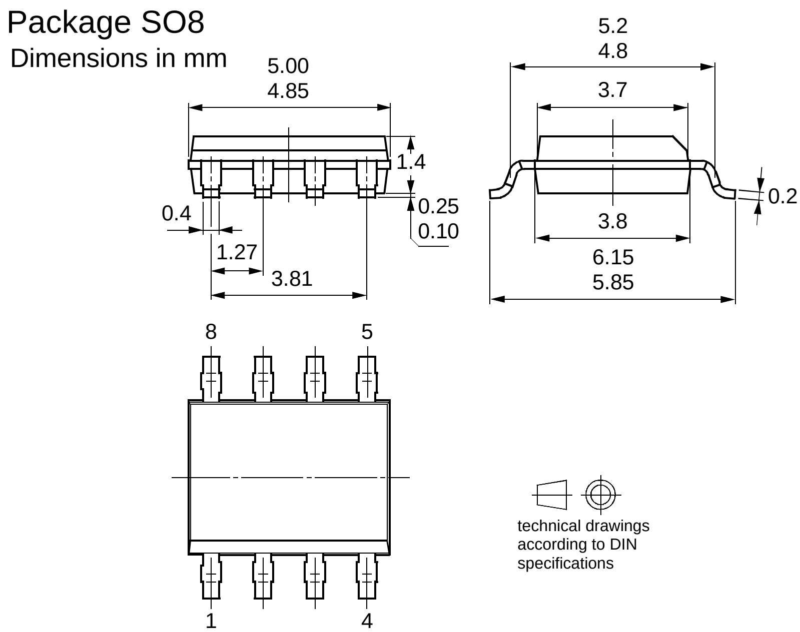
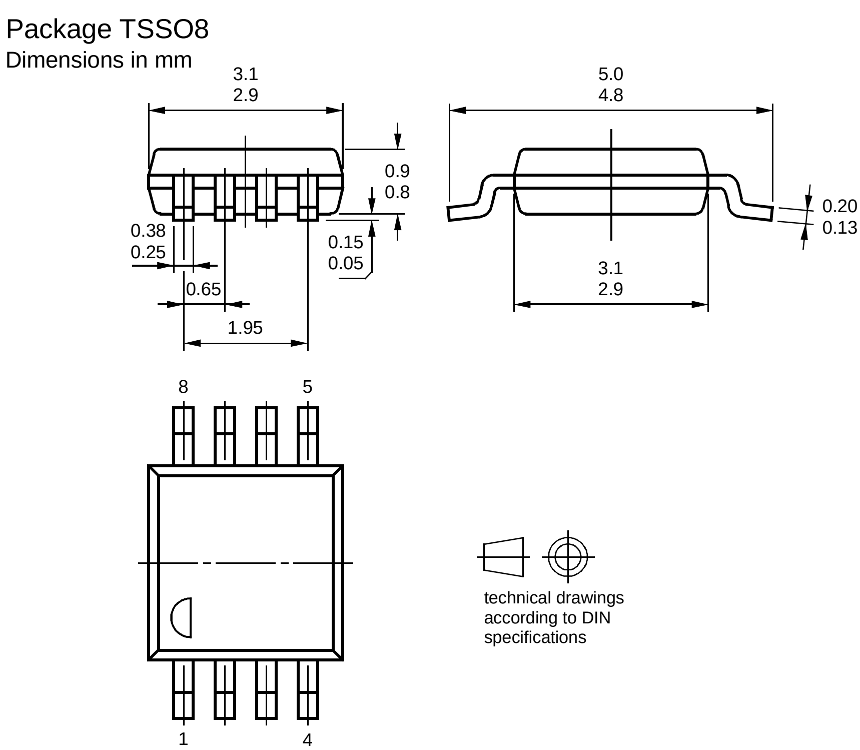


Figure 14.



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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