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## Features

- Supply Voltage: 4.5 V to 5.5 V
- Automatic Sensitivity Adaptation (AGC)
- Automatic Strong Signal Adaptation (ATC)
- Carrier Frequency is 56 kHz; Adjusted by Zener Diode Fusing  $\pm 4\%$
- TTL and CMOS Compatible

## Applications

- All Kinds of IR Remote Control Systems
- Carrier Frequency Modulated Transmission Systems

## Benefits

- No External Components Needed
- Enhanced Immunity Against Ambient Light Disturbances

## Description

The IC ATA2516 is a complete IR receiver for data communication systems. The device is developed and optimized for use in carrier frequency modulated transmission applications. Its function can be described using the block diagram in Figure 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 application. After amplification by a Controlled Gain Amplifier (CGA), the signals pass a tuned integrated narrow bandpass filter with a center frequency  $f_0$  equivalent to the chosen carrier frequency of the input signal. The demodulator is used 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 changing environmental conditions (ambient light, modulated lamps etc.). A 7-bit digital-to-analog converter is used to adjust the gain of the controlled gain amplifier. Other special features serve to adapt to the current application to secure best transmission quality. The ATA2516 operates in a voltage supply range of 4.5 V - 5.5 V.



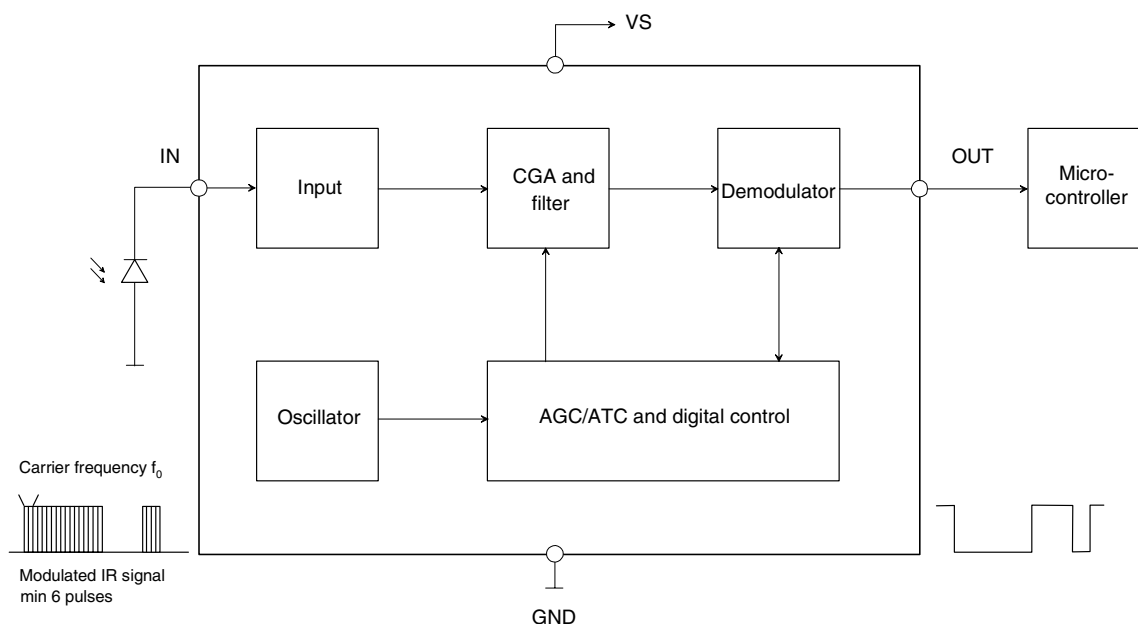
IR Receiver  
ASIC

ATA2516

Rev. 4801B-AUTO-10/04

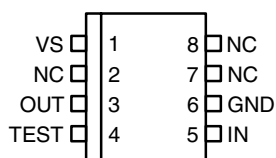


**Figure 1.** Block Diagram



## Pin Configuration

**Figure 2.** Pinning TSSOP8



## Pin Description

Pin	Symbol	Function
1	VS	Supply voltage
2	NC	Not connected
3	OUT	Data output
4	TEST	Test signal (not connected or connected to GND)
5	IN	Input PIN diode
6	GND	Ground
7	NC	Not connected
8	NC	Not connected

## 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 (DC current $I_{IN\_DC} = 0$ )	$I_S$	0.5	mA
Input voltage	$V_{IN}$	-0.3 to $V_S$	V
Input DC current at $V_S = 5$ V	$I_{IN\_DC}$	0.8	mA
Output voltage	$V_O$	-0.3 to $V_S$	V
Operating temperature	$T_{amb}$	-40 to +85	°C
Storage temperature	$T_{stg}$	-40 to +125	°C
Power dissipation at $T_{amb} = 25^\circ\text{C}$	$P_{tot}$	10	mW

## Thermal Resistance

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

## Electrical Characteristics

$T_{amb} = 25^\circ\text{C}$ ,  $V_S = 5$  V unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
<b>1</b>	<b>Supply</b>								
1.1	Supply-voltage range		1	$V_S$	4.5	5	5.5	V	C
1.2	Supply current	$I_{IN\_DC} = 0$ ; see Figure 6 on page 7	1	$I_S$		0.29	0.34	mA	A
1.3	Supply current	$I_{IN\_DC} = 0$ ; see Figure 6 on page 7 $T_{amb} = -40^\circ\text{C}$ to $85^\circ\text{C}$	1	$I_S$			0.4	mA	B
<b>2</b>	<b>Output</b>								
2.1	Internal pull-up resistor	$T_{amb} = 25^\circ\text{C}$ ; see Figure 3 on page 5	1, 3	$R_{PU}$	65	100	135	k $\Omega$	A
2.2	Output voltage low	$R_{Load} = 2.4$ k $\Omega$	3, 6	$V_{OL}$		100	250	mV	A
2.3	Output voltage high		3, 1	$V_{OH}$	$V_S - 0.25$		$V_S$	V	A
<b>3</b>	<b>Input</b>								
3.1	Maximum input DC current	$V_{IN} = 0$ ; see Figure 8 on page 7	5	$I_{IN\_DCMAX}$	580	760		$\mu\text{A}$	A
3.2	Maximum input DC current	$V_{IN} = 0$ ; $T_{amb} = 85^\circ\text{C}$	5	$I_{IN\_DCMAX}$	490	650		$\mu\text{A}$	C
3.3	Number of pulses required		5		6				A

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

Note: BER = bit error rate; e.g. BER = 5% means that with P = 20 at the input pins 19 to 21, pulses may appear at the OUT pin.

## Electrical Characteristics (Continued)

$T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 5\text{ V}$  unless otherwise specified.

No.	Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit	Type*
3.4	Minimum detection threshold current	Test signal: see Figure 4 on page 6 $V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ , $I_{IN\_DC} = 0\text{ }\mu\text{A}$ ; square pp, burst $N = 6$ , $f = f_0$ ; $t_{PER} = 5\text{ ms}$ , Figure 7; BER = 80%	5	$I_{Eemin}$	2.5	4	6.4	nA	A
3.5	Minimum detection threshold current	Test signal: see Figure 4 on page 6 $V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ , $I_{IN\_DC} = 650\text{ }\mu\text{A}$ ; square pp, burst $N = 6$ , $f = f_0$ ; $t_{PER} = 5\text{ ms}$ , Figure 7; BER = 80%	5	$I_{Eemin}$	20	30	60	nA	A
3.6	Photodiode input capacitance	$V_{IN} = 0$	5, 6			70		pF	D
<b>4</b>	<b>Controlled Amplifier and Filter</b>								
4.1	Center frequency of bandpass		3	$f_0$		56		kHz	A
4.2	Center frequency zapping accuracy of bandpass	$f_0 = 56\text{ kHz}$	3	$f_{0ZAPP}$	-4	$f_0$	+4	%	A
4.3	Overall accuracy center frequency of bandpass	$T_{amb} = -40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	3	$f_{0tol}$	-10	$f_0$	+7	%	C
4.4	BPF bandwidth	-3 dB; $f_0 = 56\text{ kHz}$ ; see Figure 9 on page 8	3	B	4	8	14	kHz	C
4.5	Quiescent value of gain control counter	$V_{IN} = 0$ ; $I_{IN\_DC} = 0$				20			A
4.6	Single gain step					0.35		dB/c	
4.7	Switch-on delay	$V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ , $I_{IN} = 20\text{ nA pp}$ , $N = 6$	3	$t_{don}$	4	6	8	Per	A
4.8	Pulse width	$V_S = 5\text{ V}$ , $T_{amb} = 25^{\circ}\text{C}$ , $I_{IN} = 20\text{ nA pp}$ , $N = 6$	3	$t_{po}$	4	8	11	Per	A

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

Note: BER = bit error rate; e.g. BER = 5% means that with  $P = 20$  at the input pins 19 to 21, pulses may appear at the OUT pin.

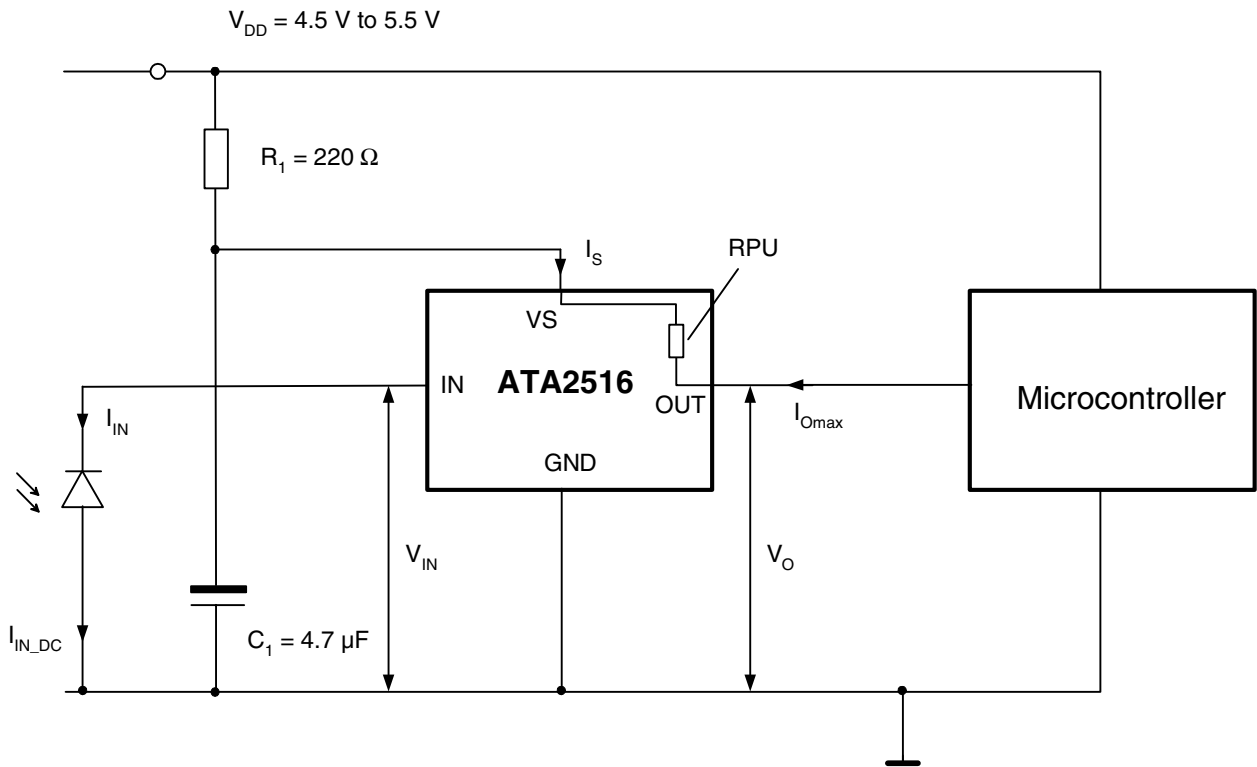
**ESD** All pins: 1500 V HBM; 100 MM, MIL-STD-883C, Method 3015.7

**Latch-up** According JEDEC78 Class2 (HT)

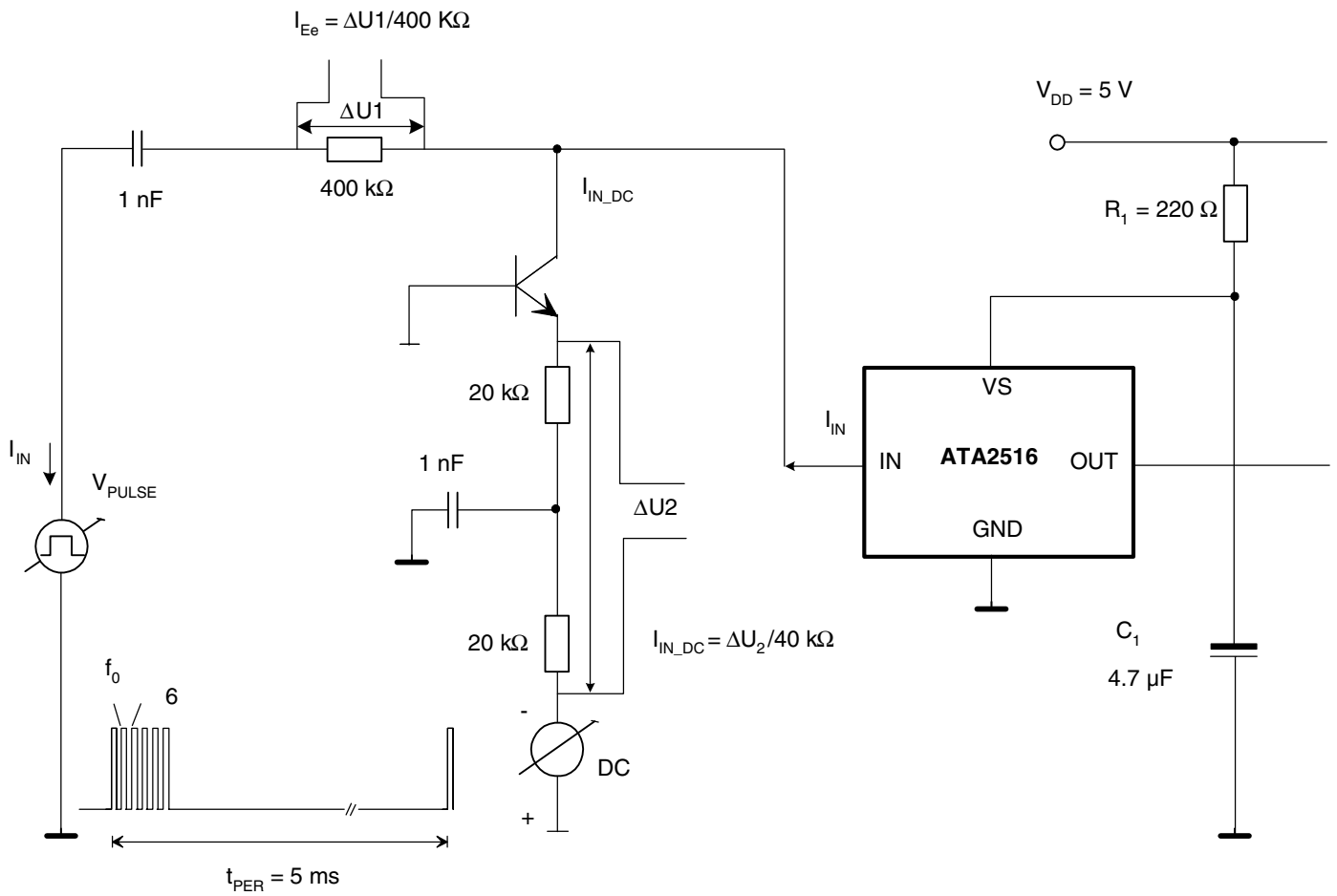
**Reliability** HTOL (1000 h) at  $T_j = 150^{\circ}\text{C}$  in molded TSSOP8 plastic package (2 lots)

**Burn-in** With 800 samples from 2 lots

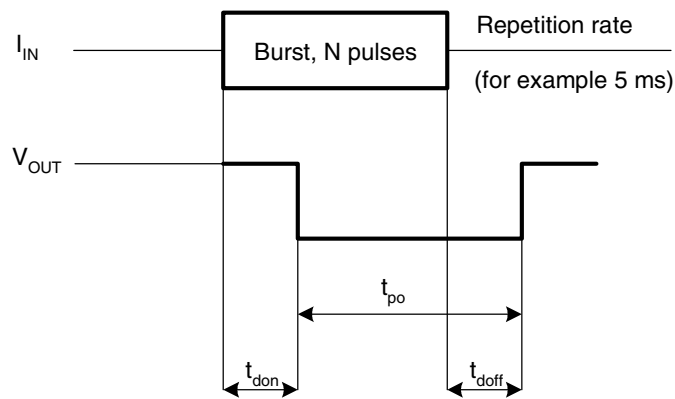
Figure 3. Application Circuit



**Figure 4.** Test Circuit



**Figure 5.** Pulse Diagram



Typical Electrical Curves

Figure 6.  $I_S$  versus Temperature,  $V_S = 5\text{ V}$

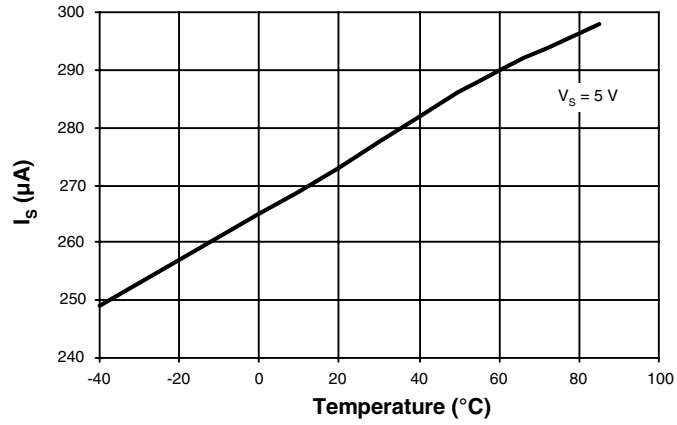


Figure 7.  $I_{Eemin}$  versus  $I_{IN\_DC}$ ,  $V_S = 5\text{ V}$ ,  $T_{amb} = 25^\circ\text{C}$

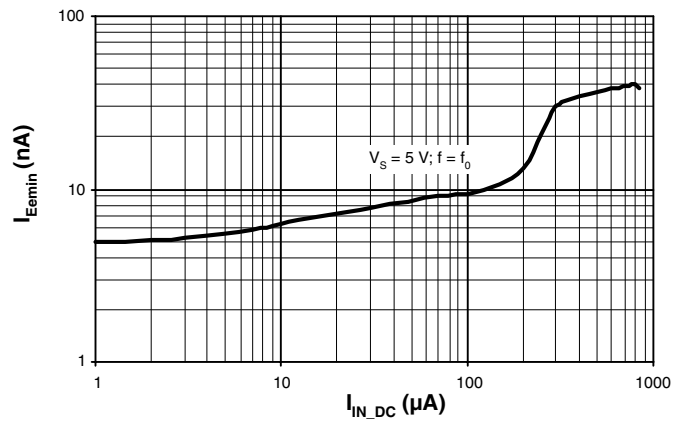
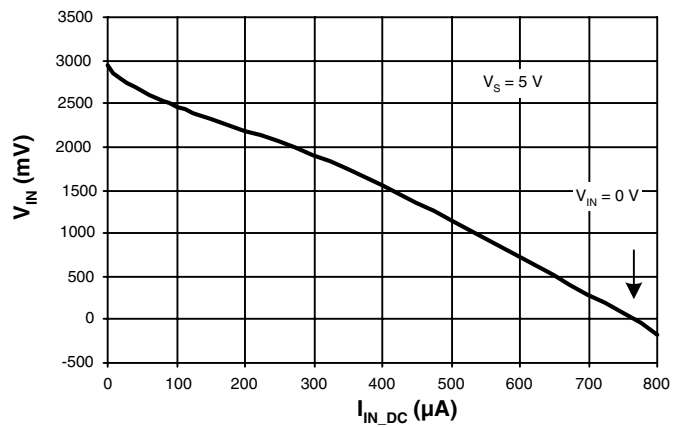
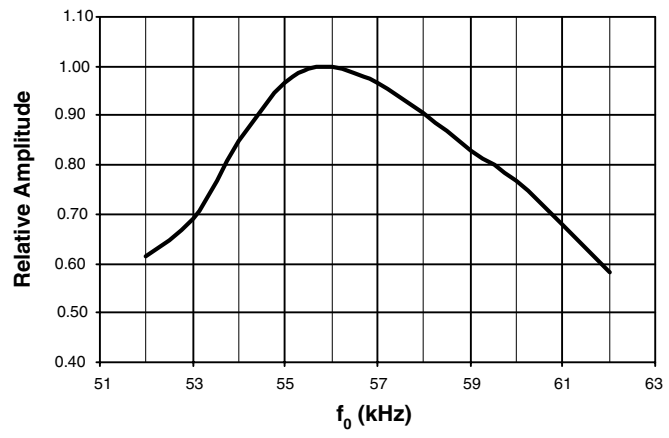


Figure 8.  $V_{IN}$  versus  $I_{IN\_DC}$ ,  $V_S = 5\text{ V}$ ,  $T_{amb} = 25^\circ\text{C}$



**Figure 9.** Typical Bandpass Curve at  $T_{amb} = 25^{\circ}\text{C}$





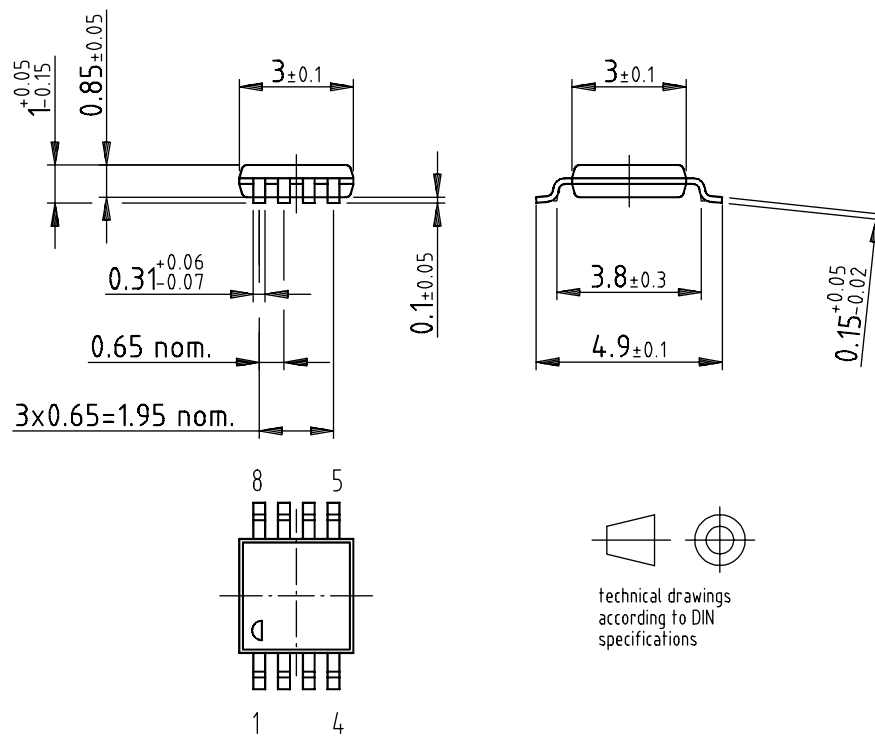
### Ordering Information

Extended Type Number	Package	Remarks
ATA2516-6AQ	TSSOP8	IR receiver

### Package Information

Package: TSSOP 8L

Dimensions in mm



Drawing-No.: 6.543-5083.01-4

Issue: 1; 08.01.02



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