

阅读申明

- 1.本站收集的数据手册和产品资料都来自互联网，版权归原作者所有。如读者和版权方有任何异议请及时告之，我们将妥善解决。
- 2.本站提供的中文数据手册是英文数据手册的中文翻译，其目的是协助用户阅读，该译文无法自动跟随原稿更新，同时也可能存在翻译上的不当。建议读者以英文原稿为参考以便获得更精准的信息。
- 3.本站提供的产品资料，来自厂商的技术支持或者使用者的心得体会等，其内容可能存在描述上的差异，建议读者做出适当判断。
- 4.如需与我们联系，请发邮件到marketing@iczoom.com，主题请标有“数据手册”字样。

Read Statement

1. The datasheets and other product information on the site are all from network reference or other public materials, and the copyright belongs to the original author and original published source. If readers and copyright owners have any objections, please contact us and we will deal with it in a timely manner.
2. The Chinese datasheets provided on the website is a Chinese translation of the English datasheets. Its purpose is for reader's learning exchange only and do not involve commercial purposes. The translation cannot be automatically updated with the original manuscript, and there may also be improper translations. Readers are advised to use the English manuscript as a reference for more accurate information.
3. All product information provided on the website refer to solutions from manufacturers' technical support or users the contents may have differences in description, and readers are advised to take the original article as the standard.
4. If you have any questions, please contact us at marketing@iczoom.com and mark the subject with "Datasheets" .



Features

- Few External Components
- Low Power Consumption
- Microcomputer Compatible
- Insensitive to Ambient Light and Other Continuous Interferences

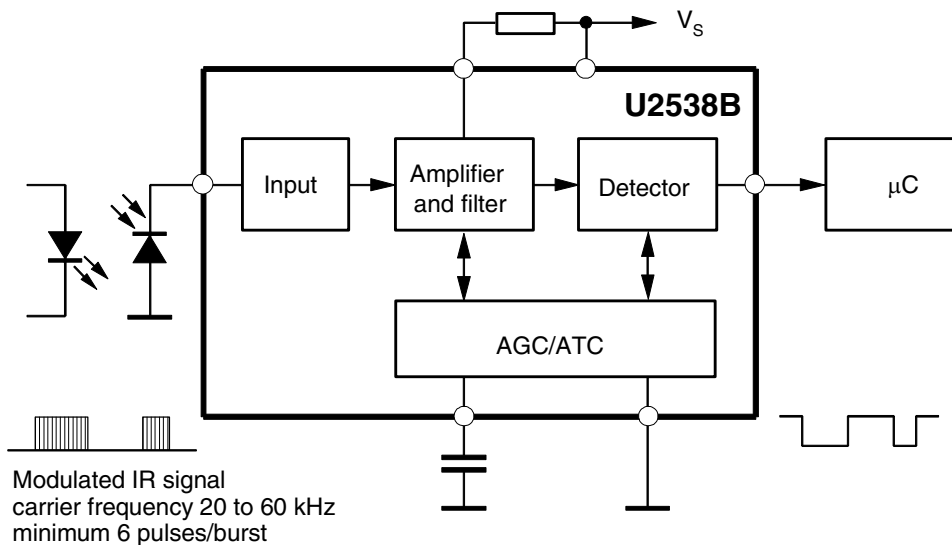
Applications

- Keyless Entry Systems
- Remote Control
- Wireless Data Transfer up to 4 kbit/s

Description

The IC U2538B is a complete IR receiver for data communication. The useful input signals are separated by a special input circuit and amplified by a gain-controlled amplifier. The bandpass filter suppresses the off-band signals. The signal detector, consisting of a demodulator, an integrator and a Schmitt trigger, forms the input signal into an output pulse that can be interfaced to a microcomputer. The AGC and the ATC circuit control the receiver's sensitivity, making it insensitive to ambient light sources.

Figure 1. Block Diagram with Typical Circuit

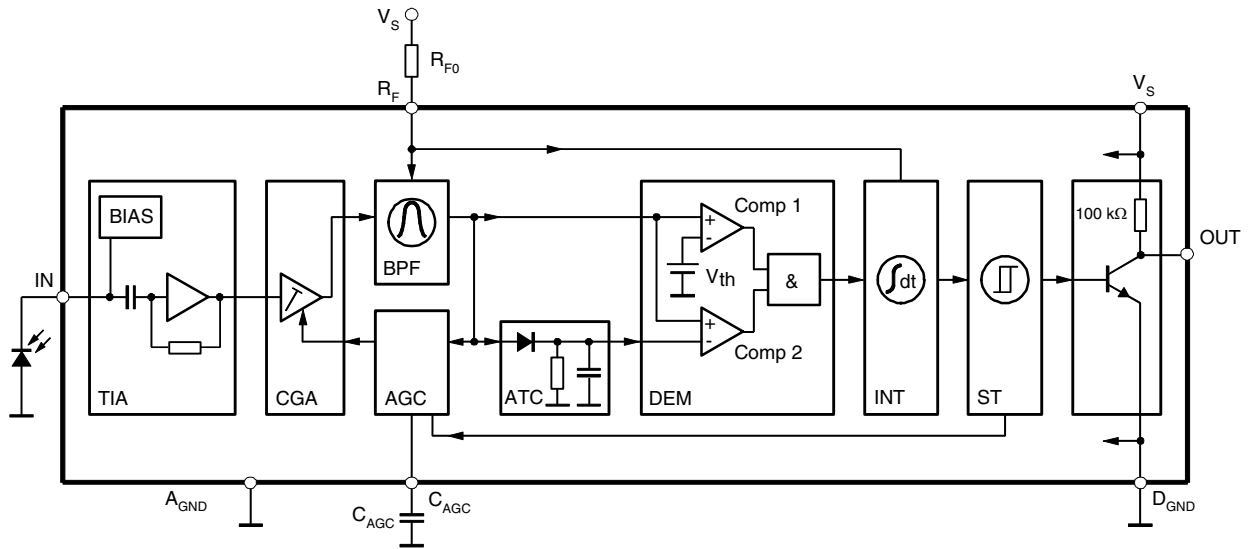


IR Receiver for Data Communication

U2538B



Block Diagram

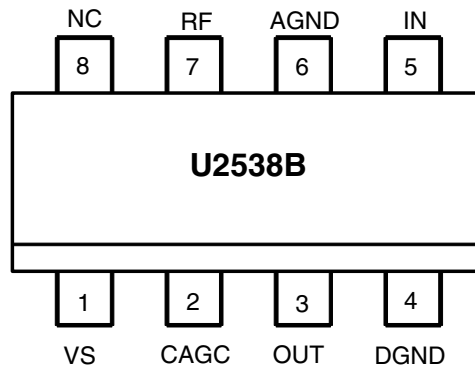


TIA Transimpedance amplifier
CGA Controlled gain amplifier
BPF Bandpass filter
AGC Automatic gain control

ATC Automatic threshold control
DEM Demodulator
INT Integrator
ST Schmitt trigger

Pin Configuration

Figure 2. Pinning SO8



Pin Description

Pin	Symbol	Function
1	VS	Supply voltage
2	CAGC	AGC capacitor
3	OUT	Data output
4	DGND	GND - DEM/INT/ST
5	IN	Input pin diode
6	AGND	GND amplifier
7	RF	Frequency determination
8	NC	Not connected

Functional Description

Input Stage (TIA)

The input stage provides the necessary bias voltage for the photo diode and ensures decoupling of the useful signal. This involves processing the DC and AC portions in separate parts of the circuit: the bias voltage (BIAS) and the transimpedance amplifier circuit (TIA). The bias voltage circuit operates like a load resistor with respect to the photo diode, the value of which is low for DC and low-frequency signals (3 to 100 kΩ), but as high as possible for the operating frequency (100 kHz to 1 MHz) depending on the input current). The ac portion of the input signal feeds an inverted amplifier with a sufficiently low input resistance ($Z_i < 10 \text{ k}\Omega$). If the input resistance is too high, the useful signal will be lost due to the junction capacitance of the photodiode.

Controlled Gain Amplifier (CGA)

The controlled gain amplifier accounts for the greatest part of the voltage gain and can be controlled via the voltage at CAGC (Pin 2). Gain control is needed to support the interference suppression of the detector. High-pass behaviour results from the capacitive coupling of the individual stages. The cut-off frequency is approximately 20 kHz.

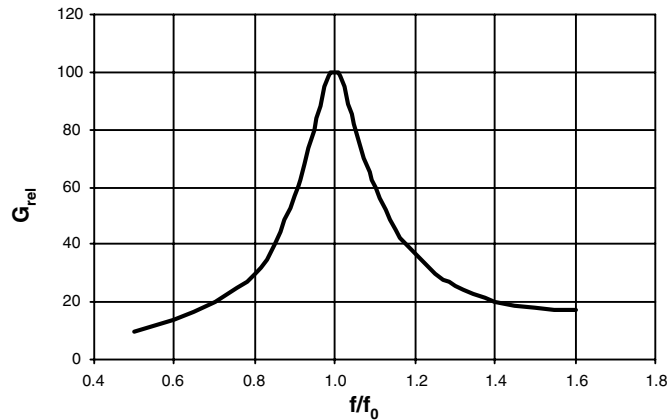
Bandpass Filter (BPF)

The bandpass filter basically consists of integrated components. An external resistor determines the mid-frequency. The filter quality is about 7 and is practically independent of the selected mid-frequency (see Figure 3). The following formula can be used for calculating the resistor, R_{f0} :

$$R_{f0}(\text{k}\Omega) = \frac{8855}{f_0(\text{kHz})} - 13$$

where: $20 \text{ kHz} < f_0 < 60 \text{ kHz}$

Figure 3. Characteristic of the Bandpass Filter



Automatic Threshold Control (ATC)

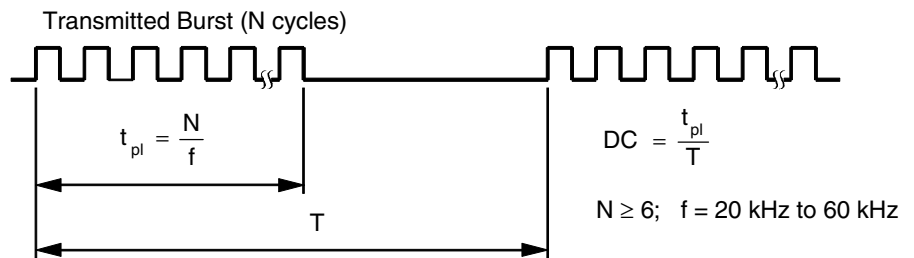
During the reception of an incoming telegram, the ATC reduces the sensitivity of the demodulator to establish the highest possible signal-to-noise ratio according to the signal strength. This prevents interferences which may arise during transmission from affecting the output. The advantage of the circuit is achieved if its output voltage exceeds V_{Th} (Comp 1). That is the case when the input signal strength is more than twice as much as the minimum detectable signal intensity.

Automatic Gain Control (AGC)

The automatic gaincontrol improves the circuit's resistance to interference by adapting the amplification of the gain-controlled amplifier to the relevant existing interference level. In order to prevent the circuit from responding to transmitted data signals, it gradually reduces the sensitivity, but only if the duty cycle exceeds a specific value (see Figure 4). When using telegrams with higher duty cycles than this value, the capacitor, C_{AGC} , maintains the sensitivity for a certain time period. A higher capacitance enables a longer transmission time. A capacitance of $C_1 = 22$ nF is adequate for most known telegrams. A typical value for the maximum duty cycle (DC) can be calculated by the following formula:

$$DC_{max} = \frac{N}{14.2 + 1.1 \times N}$$

Figure 4. Duty Cycle



Detector

The output signal of the bandpass filter is compared to a fixed reference (Comp 1) and to a reference generated by the ATC circuit (Comp 2). The output of the comparator with the higher threshold voltage controls the integrator. Using the integrator keeps the output free of short-time interference.

The integrator drives the output stage after being processed through a Schmitt trigger. The internal pull-up resistor can replace an external resistor in some applications.

Absolute Maximum Ratings

Parameters		Symbol	Value	Unit
Supply voltage	Pin 1	V_S	-0.3 to +6.0	V
Input voltages	Pin 2, 3, and 5 Pin 7	V_{IN}	-0.3 to V_S -0.3 to +1.5	V
Input current	Pin 7	I_{IN}	0 to 0.1	mA
Power dissipation $T_{amb} = 105^\circ\text{C}$		P_{tot}	110	mW
Junction temperature		T_j	125	$^\circ\text{C}$
Ambient temperature		T_{amb}	-40 to +105	$^\circ\text{C}$
Storage temperature		T_{stg}	-40 to +125	$^\circ\text{C}$

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	R_{thJA}	180	K/W

Electrical Characteristics

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

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 1	V_S	4.5		5.5	V
Supply current	Pin 1	I_S	0.35		0.65	mA
Maximum input current $V_{IN} = 0$	Pin 5	I_{IN}	0.6			mA
Output voltage low: $I_{OL} = 2\text{ mA}$	Pin 3	V_{OL}			0.2	V
Internal pull-up resistor	Pin 3	R_L	75	100	125	$k\Omega$
Center frequency of bandpass $RF = 240\text{ k}$		f_0	33.3	35	36.7	kHz
Q factor		Q		7		
Frequency range		f	20		60	kHz
AGC current source sink	Pin 2		90 70	120 100	155 140	nA nA
AGC slope	Pin 2			20		dB/V
Number of pulses required			6			
Sensitivity	Pin 5				0.7	nA(rms)
Switch-on delay, $i_{IN} = 0.7\text{ nA (rms)}$	Pin 3, see Figure 5	t_{don}	3		7.5	Period
Switch-off delay, $i_{IN} = 0.7\text{ nA (rms)}$	Pin 3, see Figure 5	t_{doff}	5		10	Period
Pulse width, $i_{IN} = 0.7\text{ nA (rms)}$, 6 pulse bursts	Pin 3, see Figure 5	t_{po}	4.5		10	Period

$$R_{fO}(k\Omega) = \frac{8855}{f_0(\text{kHz})} - 13\text{ k}\Omega$$

Figure 5. Switch On/Off Delay

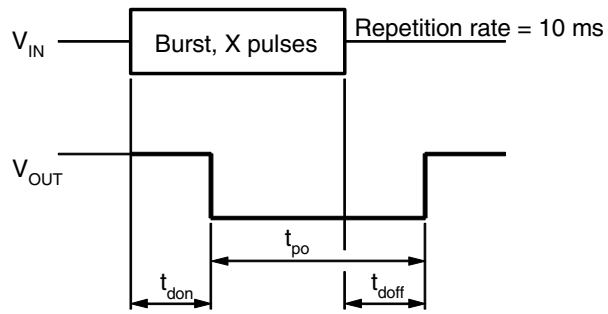
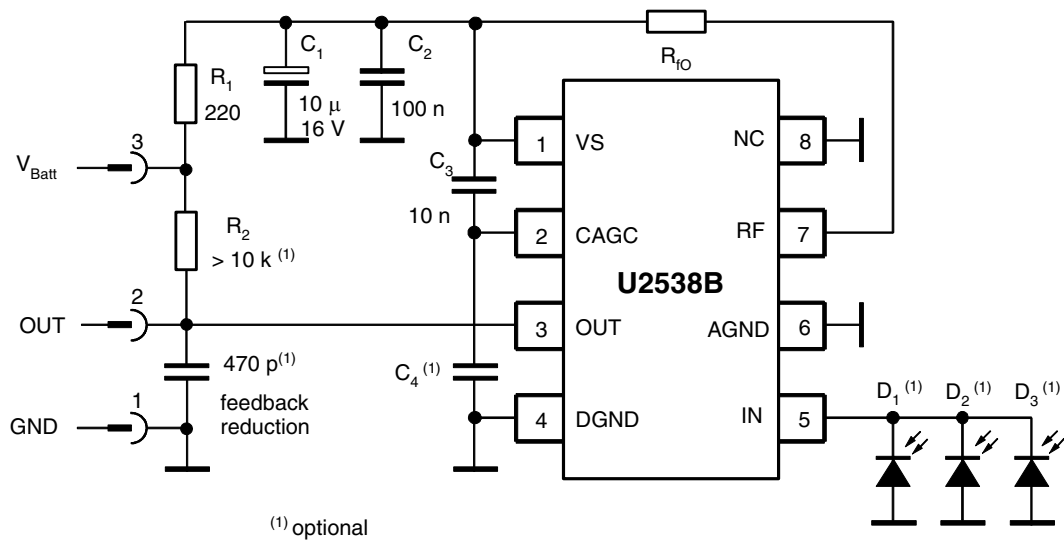


Figure 6. Application Circuit



⁽¹⁾ optional

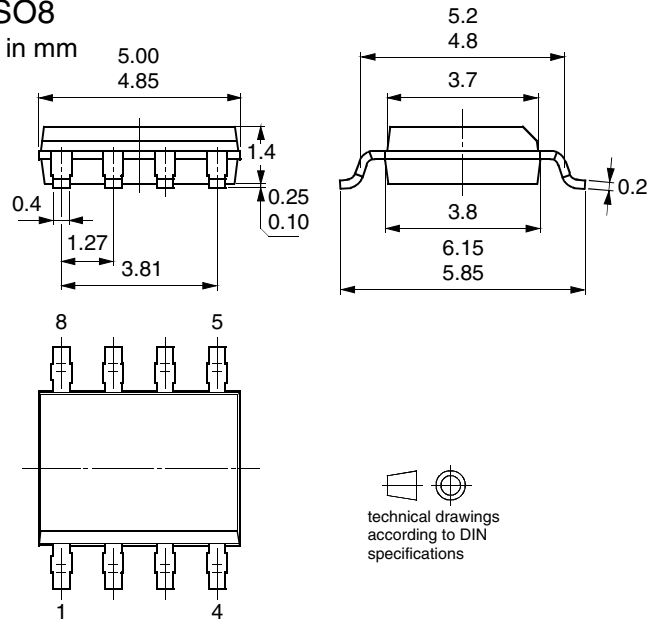
Ordering Information

Extended Type Number	Package	Remarks
U2538B-MFP	SO8	Tube
U2538B-MFPG3	SO8	Taped and reeled

Package Information

Package SO8

Dimensions in mm





Atmel Headquarters

Corporate Headquarters

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 487-2600

Europe

Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
TEL (41) 26-426-5555
FAX (41) 26-426-5500

Asia

Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimhatsui
East Kowloon
Hong Kong
TEL (852) 2721-9778
FAX (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL (81) 3-3523-3551
FAX (81) 3-3523-7581

Atmel Operations

Memory

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 436-4314

La Chantrerie
BP 70602
44306 Nantes Cedex 3, France
TEL (33) 2-40-18-18-18
FAX (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards

Zone Industrielle
13106 Rousset Cedex, France
TEL (33) 4-42-53-60-00
FAX (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
TEL (44) 1355-803-000
FAX (44) 1355-242-743

RF/Automotive

Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
TEL (49) 71-31-67-0
FAX (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Datacom

Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
TEL (33) 4-76-58-30-00
FAX (33) 4-76-58-34-80

e-mail

literature@atmel.com

Web Site

<http://www.atmel.com>

© Atmel Corporation 2003.

Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

Atmel® is the registered trademark of Atmel.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.