

## 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

- Two Alignment-free PLL FM Demodulators, Automatic Lock-in on the Received Sound Carrier Frequency
- Mono and Dual Channel Application
- Sound IF Inputs Provided for Ceramic Filters
- Automatic Mute for Second Sound Channel (Squelch)
- Mute Function for Both Sound Channels
- 5-V Supply Voltage, Low-power Consumption
- Few External Components
- Pb-free Package, which is Compliant with Requirements of RoHS



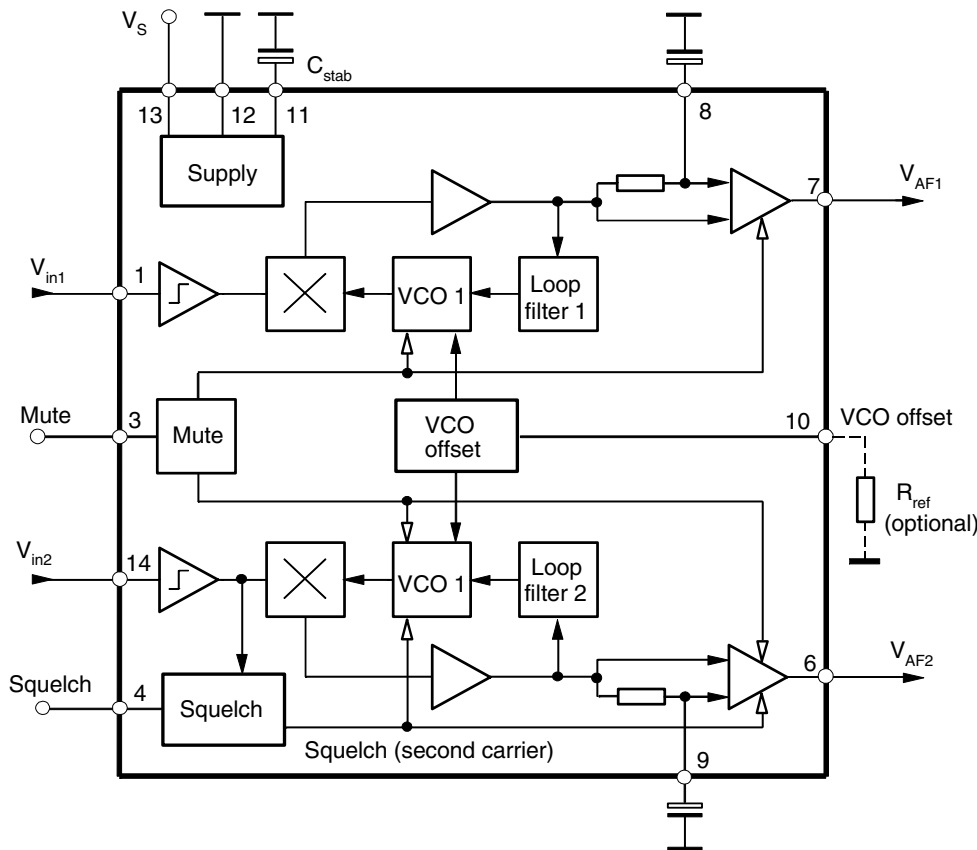
## Dual-channel FM Sound Demodulator for TV Systems

## 1. Description

The U2860B-M is a dual-channel FM sound demodulator realized with Atmel's advanced bipolar process. All TV FM standards, from 4.5 MHz up to 6.5 MHz (standard M, B/G, I, D/K) can be processed with high performance. The circuit is alignment-free and has a minimum number of external components. With 5V supply voltage, the U2860B-M is suitable for TV, VCR and multimedia applications.

## U2860B-M

Figure 1-1. Block Diagram



Rev. 4794E-TVVCR-12/05



## 2. Pin Configuration

Figure 2-1. Pinning

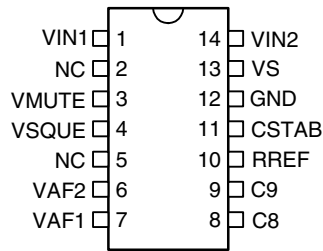


Table 2-1. Pin Description

Pin	Symbol	Function
1	VIN1	Inter-carrier input of sound channel 1 (5.5 MHz)
2	NC	Not connected
3	VMUTE	Mute for sound channel 1 + 2 "on/off"
4	VSQUE	Automatic mute for 2nd sound channel (squelch) "on/off"
5	NC	Not connected
6	VAF2	Audio output AF2 of sound channel 2
7	VAF1	Audio output AF1 of sound channel 1
8	C8	Decoupling capacitor for sound channel 1
9	C9	Decoupling capacitor for sound channel 2
10	RREF	VCO offset of the free-running frequency
11	CSTAB	Internal supply voltage stabilization
12	GND	Ground
13	VS	Supply voltage
14	VIN2	Inter-carrier input of sound channel 2 (5.74 MHz)

### **3. Circuit Description**

The U2860B-M includes two identical sound IF channels. Each consists of a limiter amplifier, PLL FM demodulator and AF amplifier. Additionally, this circuit contains a squelch function, mute switch and internal voltage regulation.

### **4. Limiter Amplifiers**

The intercarrier signals are fed through external ceramic bandpass filters to a 7-stage limiter amplifier. This guarantees high input sensitivity and excellent AM suppression.

### **5. PLL FM Demodulators**

The alignment-free Phase Locked Loop (PLL) demodulator covers a wide frequency range of 4.5 MHz up to 6.5 MHz with low-noise performance. The linear voltage to frequency characteristic results in low harmonic distortion. The free-running frequency of the internal VCO circuit is about 5.5 MHz. For this frequency, the input sensitivity and VCO locking is optimal. An additional external resistor at pin 10 allows a frequency shift of  $\pm 1$  MHz via an internal offset current. With this option, it is possible to shift the optimum conditions to the upper frequency (6.5 MHz) or to the lower frequency (4.5 MHz). The offset current acts simultaneously on both VCO circuits. If no resistor is connected, the offset current is disabled.

### **6. Audio Amplifiers**

The demodulated signals are amplified to 500 mVrms with low output impedance at the audio outputs (pin 6 and pin 7). AC decoupling at pin 8 and pin 9 of the audio amplifiers leads to high common mode rejection.

### **7. Squelch Function**

For channel 2 the audio output amplifier and VCO2 is muted automatically (squelch) when the second sound carrier is not present. This avoids a wrong identification for stereo and dual sound in the stereo decoder. Therefore, with mono sound, there is no output signal at pin 6. The automatic squelch function can be disabled by switching pin 4 to ground.

### **8. Mute Switch**

Simultaneous muting of both circuits is possible by switching pin 3 to ground.

### **9. Internal Voltage Stabilizer**

The internal bandgap reference ensures constant performance independent of supply voltage and temperature.

## 10. 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.

Reference point pin 12, unless otherwise specified.

Parameters	Pin	Symbol	Value	Unit
Supply voltage	13	$V_S$	9.0	V
Supply current	13	$I_S$	33	mA
Power dissipation $V_S = +9\text{ V}$		P	300	mW
Output currents	6, 7	$I_{out}$	$\pm 1.5$	mA
External voltages	1, 14	$V_{ext}$	2.0	V
	3, 4	$V_{ext}$	$V_S$	V
	6, 7, 8, 9, 10, 11	$V_{ext}$	4.5V	V
Junction temperature		$T_j$	+125	°C
Storage temperature		$T_{stg}$	-25 to +125	°C
Electrostatic handling <sup>(1)</sup> all pins		$V_{ESD}$	$\pm 200$	V

Note: 1. Machine model in accordance with ESD S5.2 standard.

## 11. Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient when soldering to PCB	$R_{thJA}$	90	K/W

## 12. Operating Range

Parameters	Symbol	Value	Unit
Supply voltage range, pin 13	$V_S$	4.5 to 9.0	V
Ambient temperature	$T_{amb}$	0 to 85	°C

### 13. Electrical Characteristics

$V_S = 5V$ ,  $T_{amb} = 25^\circ C$ , reference point pin , unless otherwise specified

Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit
<b>DC Supply (Pin 13)</b>							
Supply voltage range			$V_S$	4.5	5.0	9.0	V
Supply current			$I_S$		27	33	mA
<b>Intercarrier Input 1 (Pin 1)</b>							
DC input voltage			$V_{DC}$		1.75		V
Input resistance(1)			$R_{in}$		680	750	$\Omega$
Input limiting voltage	Input signal $v_{in}$ : $f = 5.5$ MHz output signal AF1: $V_{AF1} = -3$ dB		$V_{lim}$			150	$\mu V$
<b>Intercarrier Input 2, Pin 14</b>							
DC input voltage			$V_{DC}$		1.75		V
Input resistance <sup>(1)</sup>			$R_{in}$		680	750	$\Omega$
Input limiting voltage	Input signal $v_{in}$ : $f = 5.74$ MHz output signal AF2: $V_{AF2} = -3$ dB		$V_{lim}$			150	$\mu V$
Input signal for automatic second sound carrier mute off (squelch)	Audio output AF2 active		$v_{in}$	> 0.7	1.0	< 1.5	mV
<b>FM Demodulators, Internal VCO's (Pin 10)</b>							
Free-running frequency			$f_{VCO}$		5.5		MHz
Oscillator drift (free-running) as function of temperature	$\Delta T = 55^\circ C$		$\Delta f_{VCO}$		500		kHz
Oscillator shift (free-running) as function of supply voltage	$4.5V < V_S < 5.5V$		$\Delta f_{VCO}$		200		kHz
Adjustment range of free-running frequencies	By external resistor $R_{ref}$ at pin 10		$\Delta f_{adj}$	$\pm 1$			MHz
Adjustment resistance for free-running frequencies			$R_{ref}$	15	22	30	k $\Omega$
<b>FM Demodulators, Internal VCO's (Pin 10)</b>							
Steepness of free-running frequency adjustment	Resistor $R_{ref}$ at pin 10		S		200		kHz/k $\Omega$
Capture range of PLL's			$\Delta f_{cap}$	$\pm 1.4$	$\pm 1.9$		MHz
Holding range of PLL's			$\Delta f_{hold}$	$\pm 2.0$	$\pm 3.0$		MHz
<b>Audio Outputs, AF1 (Pin 7) and AF2 (Pin 6)</b>							
DC output voltage			$V_{DC}$		2.2		V
DC output current			$I_{DC}$		1.0	-1.3	mA
Output resistance <sup>(1)</sup>			$R_{out}$		150		$\Omega$
AC output peak current			$i_{AC}$			$\pm 1.0$	mA

Note: 1. This parameter is given as an application information and not measured during final testing.

### 13. Electrical Characteristics (Continued)

$V_S = 5V$ ,  $T_{amb} = 25^\circ C$ , reference point pin , unless otherwise specified

Parameters	Test Conditions	Pin	Symbol	Min.	Typ.	Max.	Unit
AF output voltage, RMS value	$v_{in} = 10\text{ mV}$ $f = 5.5\text{ MHz}$ FM-dev. = 27 kHz $f_{mod} = 1\text{ kHz}$		$V_{AF}$		500		mV
Difference between the output signals			$\Delta V_{AF}$			$\pm 1$	dB
Total harmonic distortion	$v_{in} = 10\text{ mV}$ $f = 5.5\text{ MHz}$ FM-dev. = 27 kHz $f_{mod} = 1\text{ kHz}$		THD		0.1	0.5	%
AM suppression	$v_{in} = 10\text{ mV}$ $f = 5.5\text{ MHz}$ $f_{mod} = 1\text{ kHz}$ reference signal: FM-dev. = 50 kHz test signal: $m = 30\%$		$\alpha_{AM}$	46	66		dB
Crosstalk attenuation between the AF outputs	$f = 50\text{ Hz to } 12.5\text{ kHz}$		$\alpha_{att}$		70		dB
Supply voltage ripple rejection	$V_{RR} < 200\text{ mV}$ , $f = 70\text{ Hz}$		RR		24		dB
<b>Mute Switch (Pin 3)</b>							
Control voltage - mute off - mute on	AF outputs active AF outputs not active		$V_{mute}$	2.0 0		$V_S$ 0.8	V V
Control current			$I_{mute}$		150		$\mu A$
<b>Squelch Function, (Pin 4)</b>							
Control voltage for automatic mute 2nd carrier - off - on			$V_{sque}$	0 2.0		0.8 $V_S$	V V
Control current			$I_{sque}$		150		$\mu A$

Note: 1. This parameter is given as an application information and not measured during final testing.

## 14. Diagrams

Figure 14-1. Total Harmonic Distortion

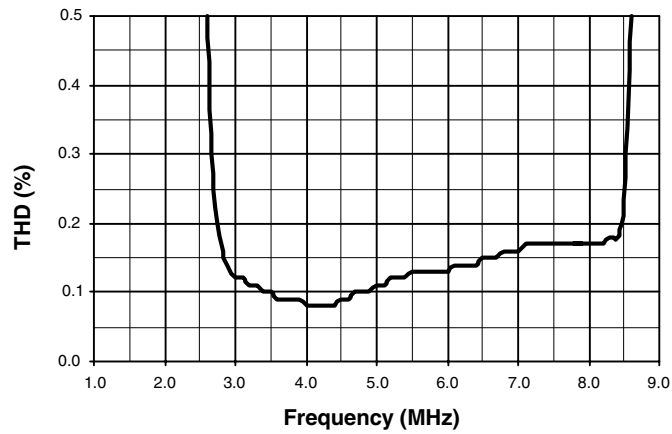


Figure 14-2. AM Suppression

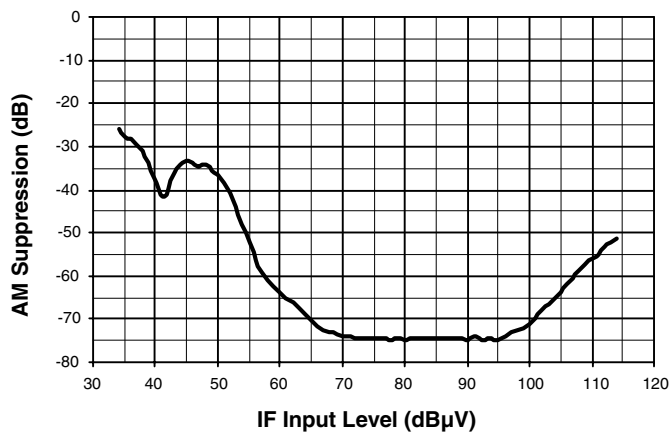
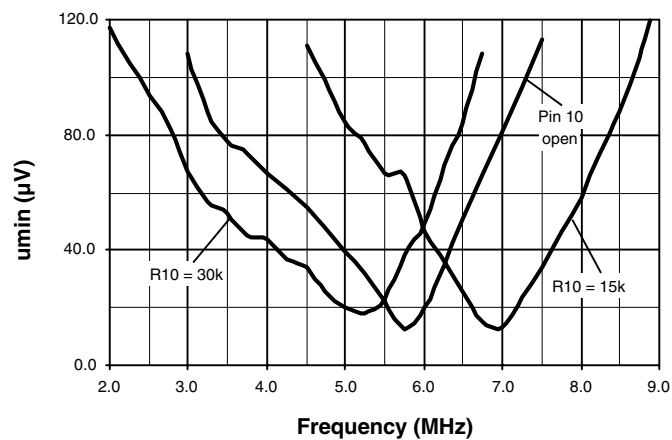
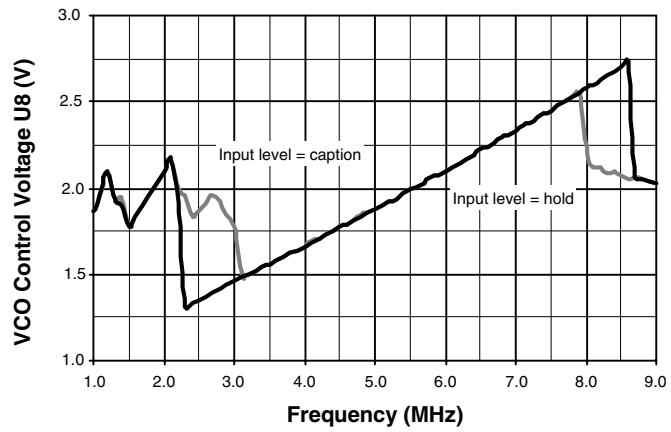


Figure 14-3. VCO Free-running Frequency

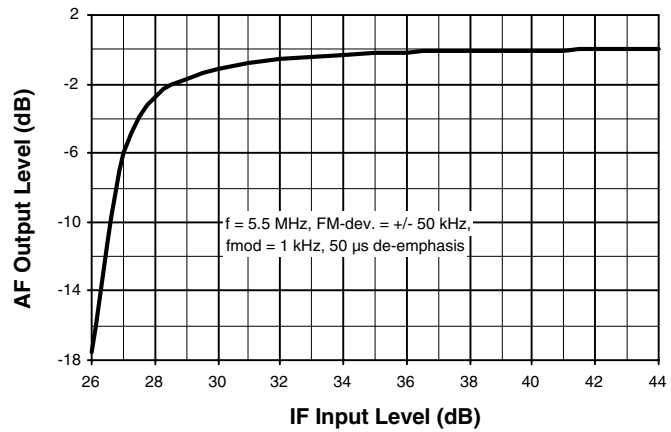




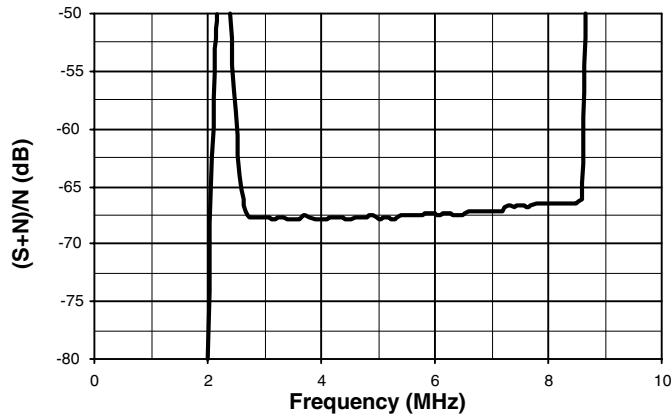
**Figure 14-4. Capture and Hold Range**



**Figure 14-5. Limiter Characteristics**



**Figure 14-6. Signal-to-noise Ratio**



## 15. Drawings

Figure 15-1. SIF Inputs

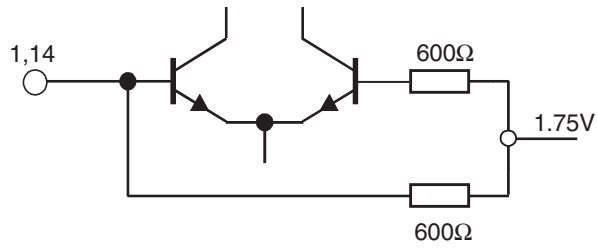


Figure 15-2. Mute Switch/Squelch Switch

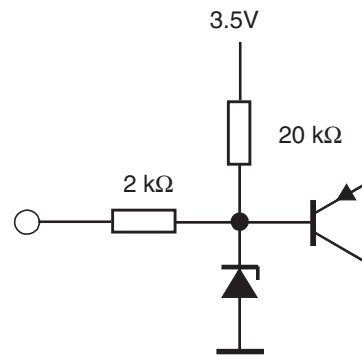
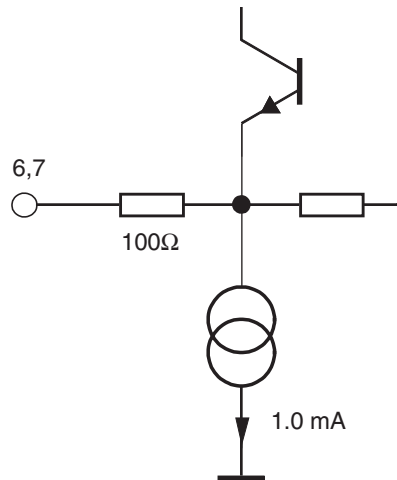
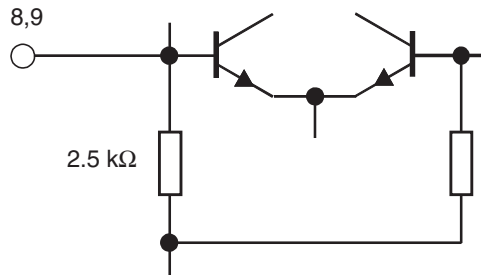


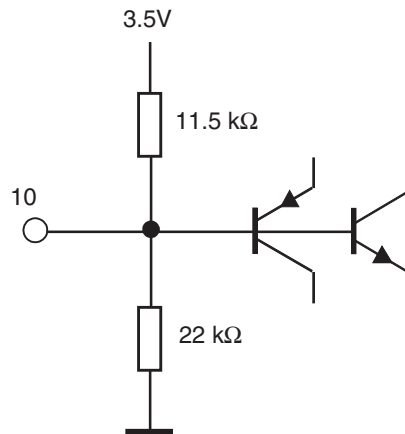
Figure 15-3. Audio Outputs



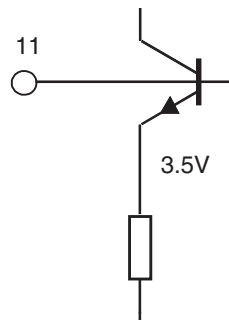
**Figure 15-4. Decoupling Capacitor**



**Figure 15-5. VCO Offset (Reference Resistor)**



**Figure 15-6. Internal Supply Voltage Stabilization**



16. Test Circuit and Application Circuit

Figure 16-1. Test Circuit

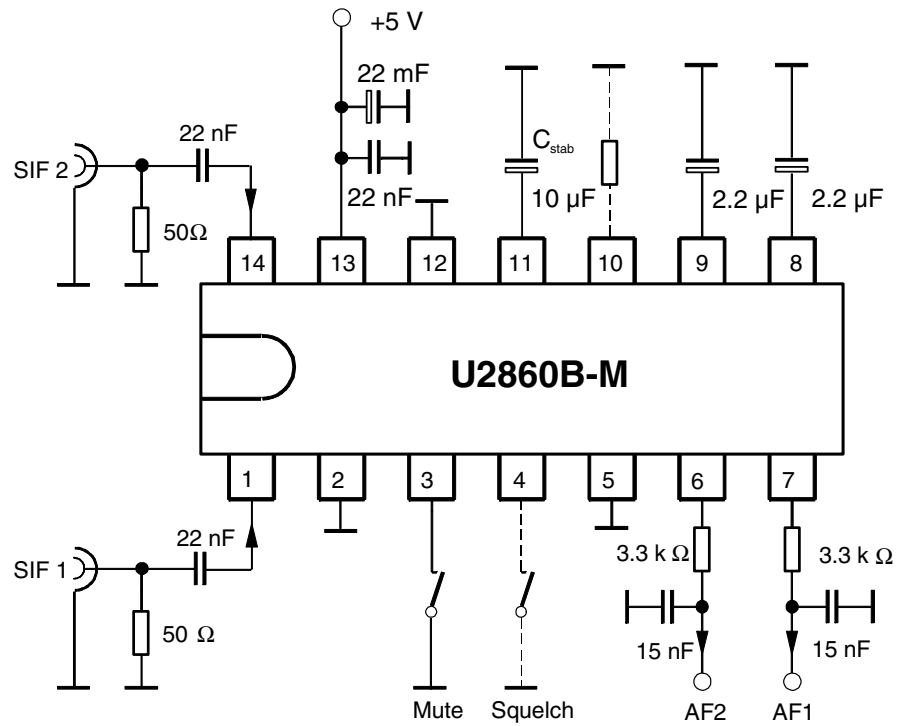
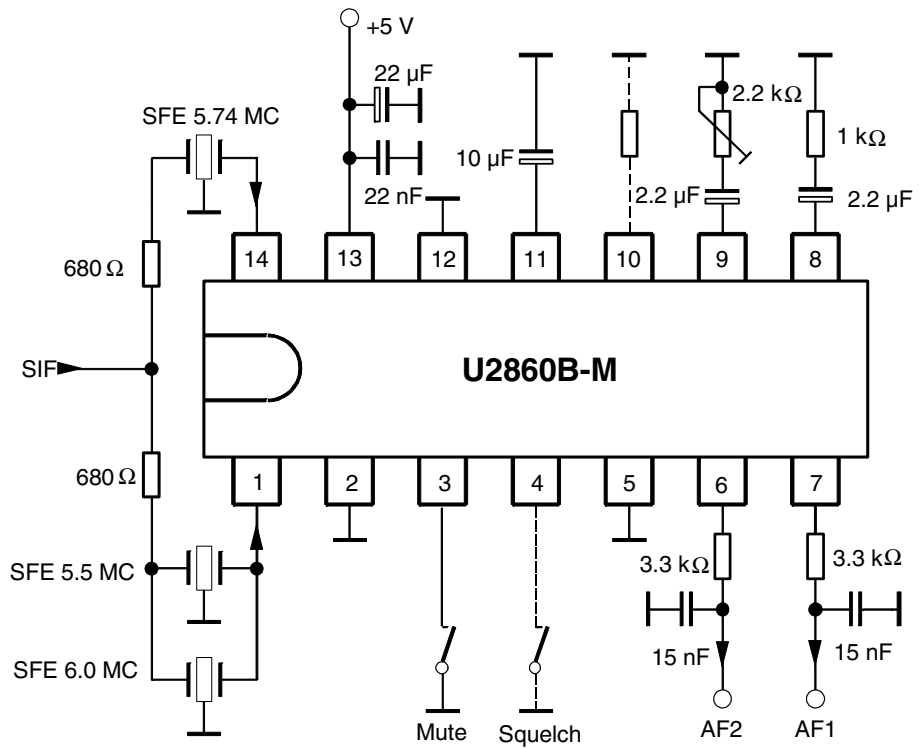


Figure 16-2. Application Circuit

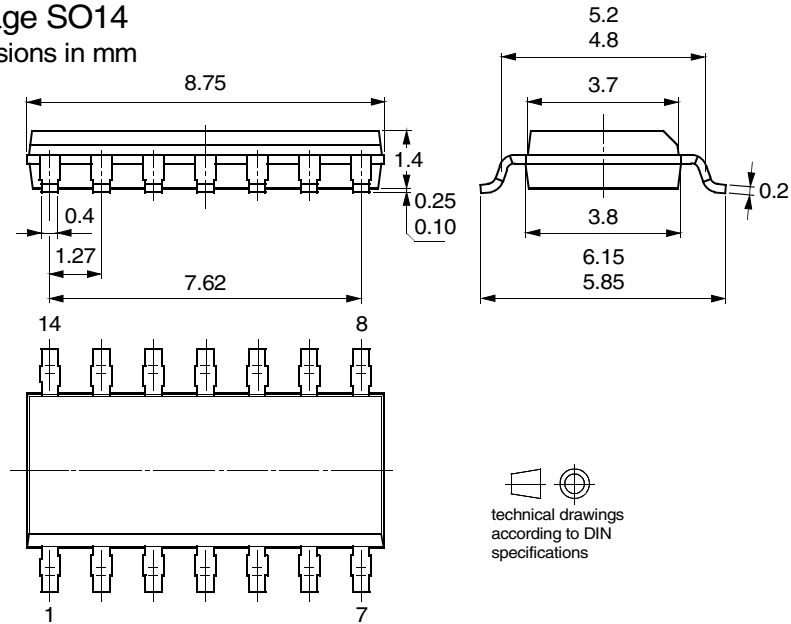


## 17. Ordering Information

Extended Type Number	Package	Remarks	Standard Package Quantity
U2860B-MFPG3G	SO14, Pb-free	Taped and reeled	4,000
U2860B-MFPY	SO14, Pb-free	Tube	3,100

## 18. Package Information

Package SO14  
Dimensions in mm





## Atmel Corporation

2325 Orchard Parkway  
San Jose, CA 95131, USA  
Tel: 1(408) 441-0311  
Fax: 1(408) 487-2600

## Regional Headquarters

### 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 Tsimshatsui  
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, USA  
Tel: 1(408) 441-0311  
Fax: 1(408) 436-4314

### Microcontrollers

2325 Orchard Parkway  
San Jose, CA 95131, USA  
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, USA  
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, USA  
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

---

### Literature Requests

[www.atmel.com/literature](http://www.atmel.com/literature)

**Disclaimer:** The information in this document is provided in connection with Atmel products. No license, express or implied, by estoppel or otherwise, to any intellectual property right is granted by this document or in connection with the sale of Atmel products. **EXCEPT AS SET FORTH IN ATMEL'S TERMS AND CONDITIONS OF SALE LOCATED ON ATMEL'S WEB SITE, ATMEL ASSUMES NO LIABILITY WHATSOEVER AND DISCLAIMS ANY EXPRESS, IMPLIED OR STATUTORY WARRANTY RELATING TO ITS PRODUCTS INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. IN NO EVENT SHALL ATMEL BE LIABLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE, SPECIAL OR INCIDENTAL DAMAGES (INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF PROFITS, BUSINESS INTERRUPTION, OR LOSS OF INFORMATION) ARISING OUT OF THE USE OR INABILITY TO USE THIS DOCUMENT, EVEN IF ATMEL HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.** Atmel makes no representations or warranties with respect to the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Atmel does not make any commitment to update the information contained herein. Unless specifically provided otherwise, Atmel products are not suitable for, and shall not be used in, automotive applications. Atmel's products are not intended, authorized, or warranted for use as components in applications intended to support or sustain life.

© Atmel Corporation 2005. All rights reserved. Atmel®, logo and combinations thereof, Everywhere You Are® and others, are registered trademarks or trademarks of Atmel Corporation or its subsidiaries. Other terms and product names may be trademarks of others.



Printed on recycled paper.

4794E-TVVCR-12/05