



**Application Note**

# AS3933

## RSSI to Voltage Conversion



**Content Guide**

1 General Description ..... 3

2 Calculation ..... 3

6 Contact Information..... 5

7 Copyrights & Disclaimer..... 6

8 Revision Information ..... 7

## 1 General Description

The AS3933 is a 3-channel low power ASK receiver that is able to generate a wakeup upon detection of a data signal which uses a LF carrier frequency between 15-150 kHz. The integrated correlator can be used for detection of a programmable 16-bit or 32-bit Manchester wakeup pattern. The device can operate using one, two, or three active channels.

The AS3933 provides a digital RSSI value for each active channel, it supports a programmable data rate and Manchester decoding with clock recovery. The AS3933 offers an internal Clock Generator, which is either derived from a crystal oscillator or the internal RC oscillator. The user can decide to use the external clock generator instead.

The programmable features of AS3933 enable to optimize its settings for achieving a longer distance while retaining a reliable wakeup generation. The sensitivity level of AS3933 can be adjusted in presence of a strong field or in noisy environments.

Antenna tuning is greatly simplified, as the automatic tuning feature ensures perfect matching to the desired carrier frequency.

The device is available in 16 pin TSSOP and QFN 4x4 16LD packages.

## 2 Calculation

$$G_{\text{Offset}} = 62 \text{ dB}$$

$$V_{\text{Ref}} = 80 \mu\text{V}_{\text{rms}}$$

$$\text{RSSI} = 0 \dots 31$$

$$\text{Gain}[\text{dB}] = G_{\text{Offset}} - 2 * \text{RSSI}$$

$$\text{Gain}[\text{dB}] = G_{\text{Offset}} - 20 * \log\left(\frac{V_{\text{in}}}{V_{\text{ref}}}\right)$$

$$2 * \text{RSSI} = 20 * \log\left(\frac{V_{\text{in}}}{V_{\text{ref}}}\right)$$

$$V_{\text{in}} = V_{\text{ref}} * 10^{\frac{\text{RSSI}}{10}}$$

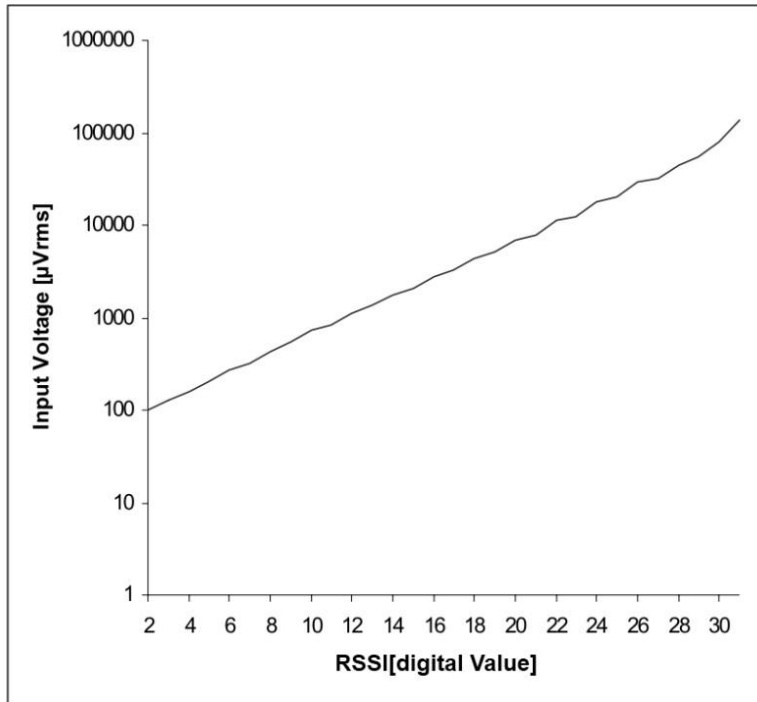
Example:

$$\text{RSSI} = 0: \quad V_{\text{in}} = V_{\text{ref}} \rightarrow V_{\text{in}} = 80 \mu\text{V}_{\text{rms}}$$

$$\text{RSSI} = 31: \quad V_{\text{in}} = V_{\text{ref}} * 10^{\frac{31}{10}} \rightarrow V_{\text{in}} = 100 \text{ mV}_{\text{rms}}$$

Graphs:

Figure 7. Sensitivity over RSSI



Addition of three channels:

$$V_{sum} = \sqrt{V_{inx}^2 + V_{iny}^2 + V_{inz}^2}$$

### 3 Contact Information

**Buy our products or get free samples online at:**

[www.ams.com/ICdirect](http://www.ams.com/ICdirect)

**Technical Support is available at:**

[www.ams.com/Technical-Support](http://www.ams.com/Technical-Support)

**Provide feedback about this document at:**

[www.ams.com/Document-Feedback](http://www.ams.com/Document-Feedback)

**For further information and requests, e-mail us at:**

[ams\\_sales@ams.com](mailto:ams_sales@ams.com)

**For sales offices, distributors and representatives, please visit:**

[www.ams.com/contact](http://www.ams.com/contact)

#### **Headquarters**

ams AG

Tobelbaderstrasse 30

8141 Unterpremstaetten

Austria, Europe

Tel: +43 (0) 3136 500 0

Website: [www.ams.com](http://www.ams.com)

## 4 Copyrights & Disclaimer

Copyright ams AG, Tobelbader Strasse 30, 8141 Unterpremstaetten, Austria-Europe. Trademarks Registered. All rights reserved. The material herein may not be reproduced, adapted, merged, translated, stored, or used without the prior written consent of the copyright owner.

Information in this document is believed to be accurate and reliable. However, ams AG does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Applications that are described herein are for illustrative purposes only. ams AG makes no representation or warranty that such applications will be appropriate for the specified use without further testing or modification. ams AG takes no responsibility for the design, operation and testing of the applications and end-products as well as assistance with the applications or end-product designs when using ams AG products. ams AG is not liable for the suitability and fit of ams AG products in applications and end-products planned.

ams AG shall not be liable to recipient or any third party for any damages, including but not limited to personal injury, property damage, loss of profits, loss of use, interruption of business or indirect, special, incidental or consequential damages, of any kind, in connection with or arising out of the furnishing, performance or use of the technical data or applications described herein. No obligation or liability to recipient or any third party shall arise or flow out of ams AG rendering of technical or other services.

ams AG reserves the right to change information in this document at any time and without notice.

## 5 Revision Information

Changes from 1-00 (2011-Jun-16) to current revision 1-01 (2014-Jul-11)	Page
Update to corporate format	1-4

**Note:** Page numbers for the previous version may differ from page numbers in the current revision.