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Application Note

AS3933

RSSI to Voltage Conversion



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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

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

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

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

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

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

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

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

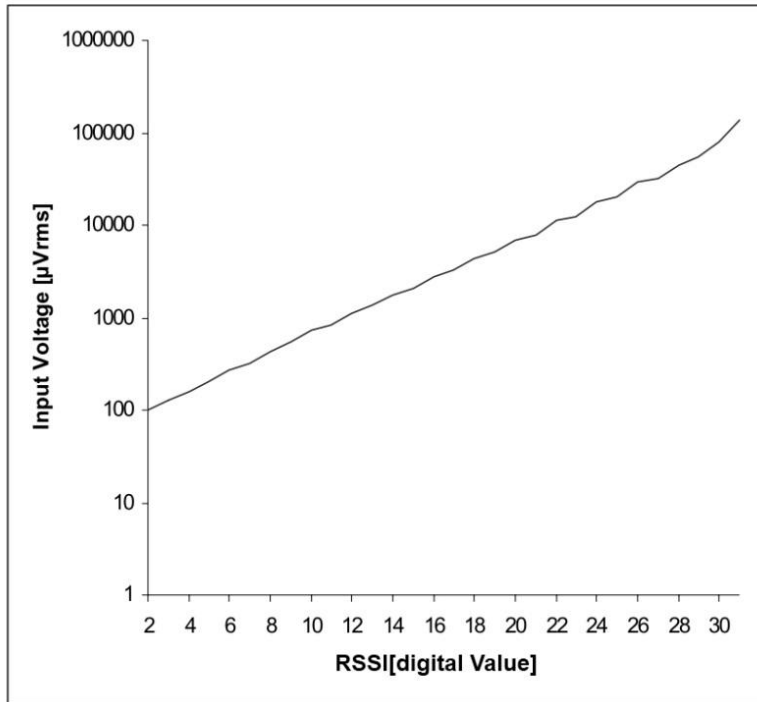
Example:

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

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

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

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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.