

RSSI-8008

Digital-Intensive Baseband RSSI with Embedded AGC

DESCRIPTION

The **RSSI-8008** is a fully integrated, digital-intensive baseband received signal strength indicator (RSSI) IP with embedded automatic gain control (AGC) for low-power wireless receivers. The architecture provides accurate digital signal-strength estimation over a wide dynamic range without requiring a high-resolution analog-to-digital converter (ADC), thereby reducing silicon area, hardware complexity, and power consumption.

The IP features a wide-dynamic-range digital RSSI architecture with embedded AGC, enabling compact, low-power, and area-efficient signal-strength monitoring and automatic gain control for wireless communication systems.

Implemented in a 65-nm CMOS process, the RSSI-8008 achieves a 80-dB dynamic range with ± 0.8 -dB detection accuracy while consuming only 0.8 mW from a 1.2-V supply. The IP is ideally suited for low-power IoT devices, wireless sensor networks, smart metering, industrial automation, wearable electronics, and software-defined radio (SDR) platforms.

KEY FEATURES

- Digital-intensive baseband RSSI with embedded AGC
- Wide dynamic range: 80 dB
- Detection accuracy: ± 0.8 dB
- 7-bit digital RSSI output
- Signal bandwidth: 20 MHz
- Eliminates high-resolution ADC for RSSI generation
- Embedded AGC with 40-dB gain-control range
- Programmable-gain amplifier (PGA) with 1-dB step size
- Two-step coarse/fine RSSI estimation
- Low power consumption: 0.8 mW
- Supply voltage: 1.2 V
- Active area: 0.39 mm² in 65-nm CMOS
- Optimized for low-power wireless and IoT receivers

APPLICATIONS

Application	Notes
IoT Sensor Nodes	Low-power wireless connectivity
Wireless Sensor Networks	Signal-strength monitoring
Smart Metering	Reliable RF link monitoring
Wearable Devices	Battery-powered operation
Software-Defined Radio	Digital signal-strength estimation for multi-standard wireless platforms

ELECTRICAL SPECIFICATIONS

$T_A = 27^\circ\text{C}$, $V_{DD} = 1.2\text{ V}$, unless otherwise noted.

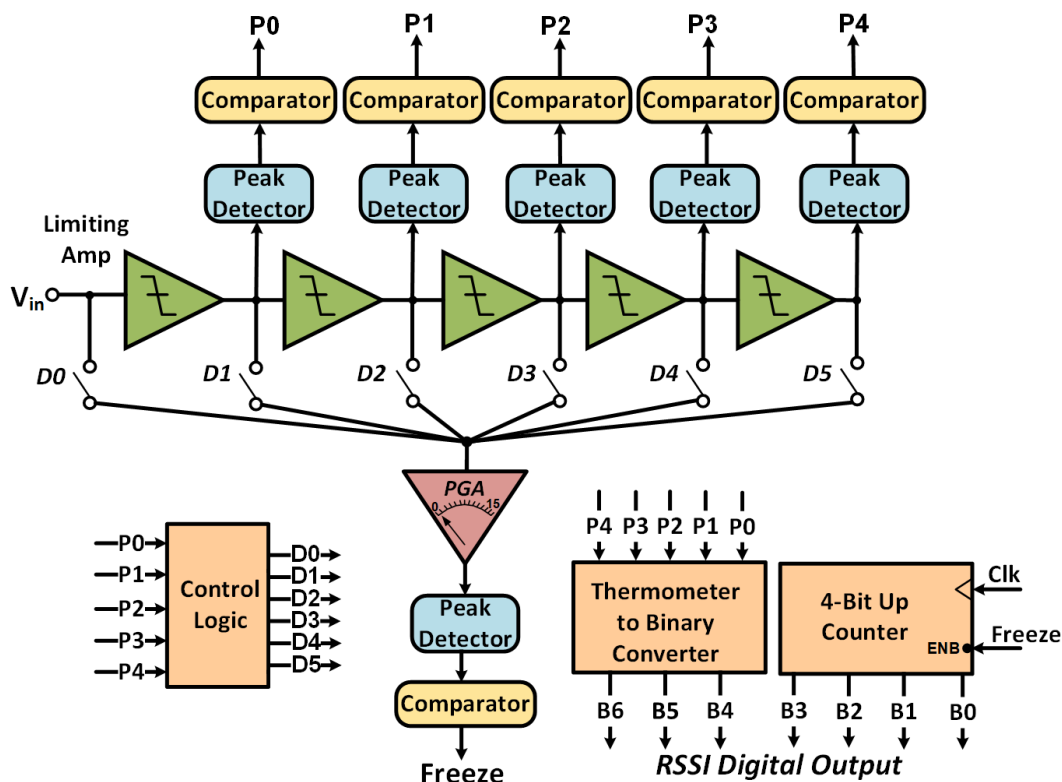
Parameter	Value	Unit	Conditions
Dynamic Range	80	dB	
Detection Accuracy	± 0.8	dB	Over dynamic range
RSSI Output	7	bits	Digital output
PGA Step Size	1	dB	Programmable

AGC Control Range	40	dB	Embedded AGC
Signal Bandwidth	20	MHz	Baseband
Power Consumption	0.8	mW	VDD = 1.2 V
Supply Voltage	1.2	V	Core Supply

POWER CONSUMPTION

Block	Power	Supply	Notes
Limiting Amplifier Chain	600 μ W	1.2 V	Multi-stage limiting amplifiers
Peak Detectors & Comparators	12.4 μ W	1.2 V	Signal level detection
Programmable-Gain Amplifier (PGA)	100 μ W	1.2 V	1-dB step size
Digital Control Logic	87.6 μ W	1.2 V	Digital control and processing circuitry

ARCHITECTURE OVERVIEW



RSSI Signal Path

- Multi-stage limiting-amplifier chain enables wide-dynamic-range signal-strength detection.

AGC

- Integrated AGC reuses the RSSI signal path for gain control.

- Two-step coarse/fine RSSI estimation provides accurate 7-bit digital output.
- Programmable-gain amplifier (PGA) provides 1-dB resolution for fine signal-strength measurement.
- Eliminates the need for a high-resolution ADC, reducing power and silicon area.
- Delivers an 80-dB dynamic range with ± 0.8 -dB detection accuracy.
- Eliminates the need for a dedicated AGC sensing path.
- Provides a 40-dB programmable gain-control range.
- Supports fast and stable gain adaptation over varying input signal levels.
- Optimized for low-power wireless and IoT receiver applications.

ABSOLUTE MAXIMUM RATINGS

Stress above listed limits may permanently damage the device. Functional operation at these limits is not implied.

Parameter	Limit	Unit
Core Supply Voltage (VDD)	1.2 + 0.3	V
Digital Buffer Supply Voltage	1.2 + 0.3	V
Operating Temperature	-40 to +85	°C
ESD Rating (HBM)	2000	V

DEVICE INFORMATION

Parameter	Value
Part Number	RSSI-8008
Technology	65 nm CMOS (TSMC 1P9M)
Die Size (Active)	0.39 mm ²
Die Supply (Core)	1.2 V
Package	QFN40
Operating Temperature Range	-40°C to +85°C

DESIGN SUPPORT & RELATED RESOURCES

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