



w i r e l e s s



## IA4320 UNIVERSAL ISM BAND FSK RECEIVER

**Programmable, low-power data receiver for robust, low-cost wireless links**

### PRODUCT OVERVIEW

Integration's IA4320 is a single chip, low power, multi-channel FSK receiver designed for use in applications requiring FCC or ETSI conformance for unlicensed use in the 315 MHz, 433 MHz, 868 MHz, and 915 MHz bands. The IA4320 is a highly integrated, flexible, low-cost solution that requires no production alignments. Used in conjunction with Integration's IA4220/21 FSK transmitters, the IA4320 allows the user to build robust, low-cost RF data links. As such, it is ideal for high volume wireless applications, including remote control systems, home security and alarm systems, wireless keyboard/mouse and other PC peripherals, toys, and automotive applications, including remote keyless entry and low tire pressure alert. Industrial applications like telemetry, personal/patient data logging, barcode readers, and automatic meter reading are also supported.

The IA4320 has a completely integrated PLL for easy RF design, and its rapid settling time allows for fast frequency hopping, bypassing multipath fading and interference. The PLL's high resolution allows for the use of multiple channels in any of the bands.

The IA4320 also includes Automatic Frequency Control (AFC) to ensure that the receiver is automatically tuned to the incoming signal. With the inclusion of the AFC, OEMs have the option to use inexpensive crystals and still be assured of the desired tuning. In addition to the analog and digital output modes, the IA4320 is configurable into a standalone mode that is especially suitable for simpler applications that do not require a microcontroller, and need to fit onto a very small PCB. To reduce current

consumption, the IA4320 supports a low-power duty cycle mode (LPDM) that operates in conjunction with the receiver's internal wake-up timer. Other auxiliary functions include an RSSI circuit, a low battery detector, a data quality detector (DQD), an RX pattern recognition circuit, and a 16-bit on-chip RX data FIFO.

In addition to the receiver parameters (LNA gain, baseband filter bandwidth, data rate, AFC, crystal load capacitance, etc.) the output mode, microcontroller clock divider, wake-up timer, and low battery detector are all programmable through the SPI compatible serial interface.

### Product Features

- Fully integrated (low BOM, easy design-in)
- Fast settling, programmable, high-resolution PLL synthesizer
- Fast frequency hopping capability
- High bit rate (up to 115.2 kbps in digital mode and 256 kbps in analog mode)
- Programmable baseband bandwidth (67 kHz - 400 kHz)
- RSSI output (digital and analog)
- Alternative OOK support
- 16-bit RX data FIFO
- Data quality detector (DQD)
- RX pattern recognition circuit
- Automatic frequency control
- Standalone mode supported (no microcontroller required)
- SPI bus for applications with microcontroller
- Low power duty cycle mode (LPDM)
- Low battery detection
- 2.2 to 5.4V operation supply voltage
- Low power consumption (~9mA in low band)
- Low standby current (0.3uA)
- Compact 16-pin TSSOP



## Integration's EZRadio™ Easy RF for Robust, Low-Cost Data Communication Applications

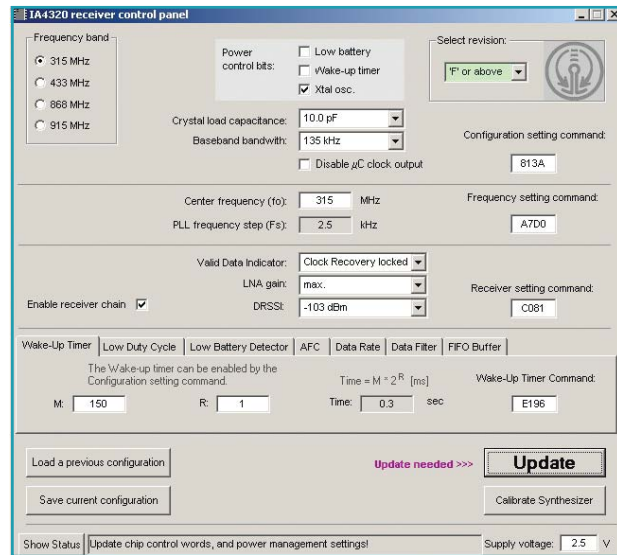
Wireless data transmission methods hold out the promise of a whole new generation of smarter products in a variety of consumer and industrial market segments. But concerns about the difficulties associated with RF design, manufacturing, and tuning have presented a barrier to entry. In addition, worries about the reliability of wireless links and the higher costs associated with wireless components have kept OEMs in toy markets, home security, and the automotive industry, for example, from moving beyond the limitations of traditional data transmission via cables, infrared links, etc.

Integration's IA4320 Universal ISM Band FSK Receiver, together with the IA4220/21 Universal ISM Band FSK Transmitters, utilizes Integration's EZRadio technology to create a complete, application-level solution for designers and OEMs looking to create smarter wireless applications. With Integration's EZRadio approach, each of the potential downsides to designing for global unlicensed frequencies are addressed, making it possible for OEMs with little RF product experience to design in complete, low-cost wireless functionality without incurring the liabilities previously associated with RF.

The IA4320 receiver, like its counterparts the IA4220/21 transmitters, is fully integrated, with all RF components on-chip to ensure the smallest possible BOM and the preservation of valuable PCB real estate. Only an external crystal is required. Both ICs come with a fast-settling, programmable, high resolution PLL synthesizer for easy RF design, and both employ fast frequency hopping to counter the effects of multipath fading and interference from other transmitters working in the same frequency bands, thus ensuring highly secure and robust wireless links. Receiver features such as the AFC further reduce costs by allowing for the use of lower cost crystals, and by eliminating the need for expensive production alignments. The availability of a standalone mode makes the IA4320 suitable for less sophisticated applications with very small PCBs that can still benefit from the inclusion of smarter RF.

# Integration Wireless Development Suite

The IA4320 software interface lets the developer select desired parameters under laboratory conditions. A generic interface board is provided in order to connect dedicated evaluation boards to a PC via the serial interface.

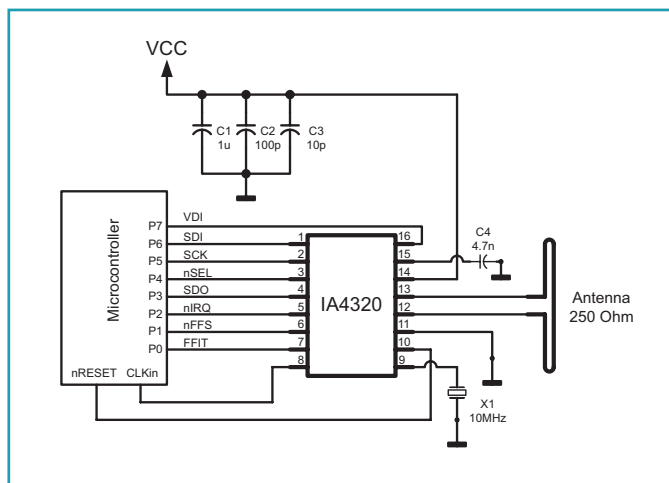


> Receiver user interface with selectable frequency bands, center frequency, receiver bandwidth, and other user-programmable parameters.

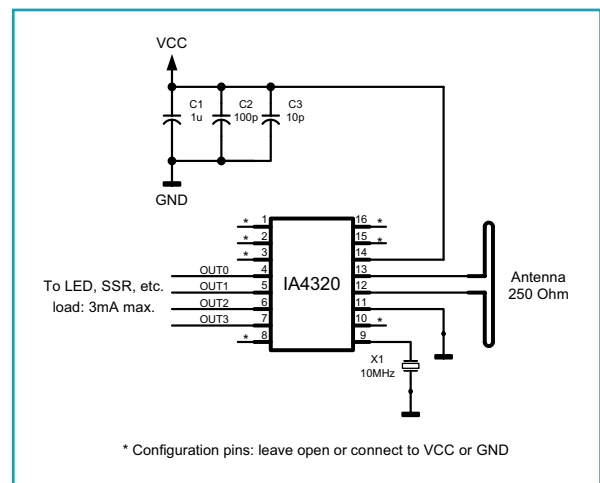
## Typical Application Configurations

In microcontroller mode the parameters of the IA4320 are fully programmable via an SPI compatible interface. There are various status and data read options. Power-on reset and clock signals for the microcontroller are available.

In standalone mode, the IA4320 requires a minimum number of external components. Several pre-defined settings can be selected by hardwiring the configuration pins. Four outputs can be directly controlled (switched on/off) by sending the appropriate data sequence to the receiver. A suitable antenna can be connected directly to the receiver. For details, see the Antenna Application Note.



Microcontroller mode



Standalone mode

\* Configuration pins: leave open or connect to VCC or GND

## Key Operating Specifications

PARAMETER	MIN	TYP	MAX	UNITS	DESCRIPTION/COMMENTS
T <sub>operating</sub>	-40		+85	°C	Ambient operating temperature
V <sub>DD</sub>	2.2		5.4	V	Supply voltage
I <sub>DD</sub> in low bands		9		mA	Supply current (in 315/433 MHz bands)
I <sub>DD</sub> in high bands		12		mA	Supply current (in 868/915 MHz bands)
I <sub>DD</sub> sleep mode		0.3		µA	Supply current, all blocks disabled
BR <sub>analog</sub>	0.6		256	kbps	Bit rate with analog data filter
BR <sub>digital</sub>			115.2	kbps	Bit rate with digital data filter
BW	67		400	kHz	Programmable baseband bandwidth
f <sub>o</sub> 315MHz band	310.24		319.75	MHz	Frequency resolution: 2.5 kHz
f <sub>o</sub> 433MHz band	430.24		439.75	MHz	Frequency resolution: 2.5 kHz
f <sub>o</sub> 868MHz band	860.48		879.51	MHz	Frequency resolution: 5.0 kHz
f <sub>o</sub> 915MHz band	900.72		929.27	MHz	Frequency resolution: 7.5 kHz
t <sub>lock</sub>		20		µs	PLL settling time
P <sub>min</sub> in low bands		-111		dBm	Receiver sensitivity @ 1.3 kbps, 10 <sup>-3</sup> BER
P <sub>min</sub> in high bands		-107		dBm	Receiver sensitivity @ 1.3 kbps, 10 <sup>-3</sup> BER
AFC <sub>range</sub>			0.8 • BW	kHz	Programmable AFC locking range
t <sub>wake-up</sub>	1		5 • 10 <sup>11</sup>	ms	Programmable wake-up time
V <sub>lb</sub>	2.2		5.3	V	Programmable low battery detection level

## About Integration

One of the fastest-growing fabless semiconductor companies in Silicon Valley, Integration designs and delivers tested wafers and packaged ICs for RF, Infrared, Modem/Wireline, and Power Management applications for a wide range of systems, from notebook computers to communications networks. With more than 10 years of leadership in the industry and our unique expertise in analog and mixed-signal semiconductor design, we're helping to power today's revolution in connectivity.

Integration is headquartered in Mountain View, California USA, with facilities and teams in Budapest, Hungary, Lisbon, Portugal, and Valley Forge, Pennsylvania USA. For more information about Integration and/or Integration products, visit our Web site at: [www.integration.com](http://www.integration.com).



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IA4320-PB v. 2.0 09/04

### ORDERING INFORMATION

PRODUCT:	IA4320	DEMO APPLICATIONS:	IA4320-DA-WK
DATASHEET:	IA4320-DS		IA4320-DA-PB
APPLICATION NOTE:	IA4320-AN		IA4320-DA-LD
DEVELOPMENT KIT:	IA4320-DK		
DEMO BOARD:	IA4320-DB		

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