Si4432/31/30

ISM Transceiver

Description

Silicon Laboratories' Si4432/31/30 highly-integrated, single chip wireless ISM transceiver is part of the EZRadioPRO™ family. The EZRadioPRO family includes a complete line of transmitters, receivers, and transceivers allowing the RF system designer to choose the optimal wireless part for their application.

The Si4432/31 offers advanced radio features, including continuous frequency coverage from 240–930 MHz and adjustable output power of up to +20 dBm with the Si4432. The Si4430 offers frequency coverage from 900 to 960 MHz to support the Japanese frequency bands. The Si4432/31/30's high level of integration offers reduced BOM cost while simplifying overall system design. The extremely low receive sensitivity (–118 dBm) coupled with the Si4432's industry-leading +20 dBm output power ensures extended range and improved link performance. Built-in antenna diversity and support for frequency hopping can be used to further extend range and enhance performance. Antenna diversity is completely integrated into the Si443x and can improve the system link budget by 8–10 dB, resulting in substantial range increases under adverse environmental conditions.

Additional system features, such as an automatic wake-up timer, low battery detector, 64 byte TX/RX FIFOs, automatic packet handling, and preamble detection, reduce overall current consumption and allow the use of lower-cost system MCUs. An integrated temperature sensor, general-purpose ADC, power-on-reset (POR), and GPIOs further reduce overall system cost and size.

The Si4432/31/30 receiver uses a single-conversion architecture to convert the 2-level FSK/GFSK/OOK modulated receive signal to a low IF frequency. Following a programmable gain amplifier (PGA) the signal is converted to the digital domain by a high-performance delta-sigma ADC allowing filtering, demodulation, slicing, error correction, and packet handling to be performed in the built-in DSP, increasing the receiver's performance and flexibility versus analog based architectures.

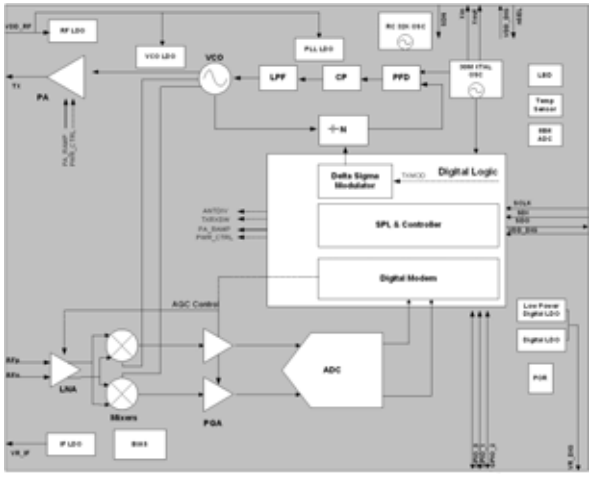
The PA is single-ended to allow for easy antenna matching and low BOM cost. The digital transmit modulation and automatic PA power ramping ensure precise transmit modulation and reduced spectral splatter, ensuring compliance with FCC and ETSI regulations. The Si4430 is designed to ensure compliance with ARIB regulations. The Si4432/31/30 is designed to work with an MCU, crystal, and a few passives to create a very low-cost system. Voltage regulators are integrated on-chip, which allows for a wide range of operating supply voltage conditions from +1.8 to +3.6 V.

Features

- Frequency Range = 240–930 MHz (Si4432/31)
  900–960 MHz (Si4430)
- Sensitivity = –118 dBm
- FSK, GFSK, and OOK modulation
- Max Output Power = +20 dBm (Si4432)
  +13 dBm (Si4431/30)
- Low Power Consumption
  - 18.5 mA receive
  - 27 mA @ +11 dBm transmit
- Data Rate = 1 to 128 kbps
- Power Supply = 1.8 to 3.6 V
- Ultra low power shutdown mode
- Wake-up timer
- Auto-frequency calibration (AFC)
- Antenna diversity and TR switch control
- Programmable packet handler
- TX and RX 64 byte FIFOs
- Low battery detector
- Temperature sensor and 8-bit ADC
- Frequency hopping capability
- On-chip crystal tuning
- 20-Pin QFN package
- Low BOM

Applications

- Remote control
- Home security and alarm
- Telemetry
- Toy control
- Remote meter reading
- Remote keyless entry
- Home automation
- Industrial control
- Sensor networks
- Health monitors
- Tag readers

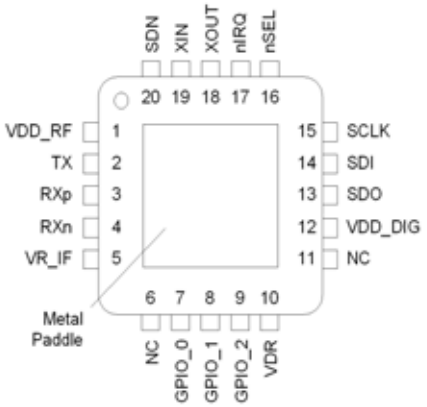


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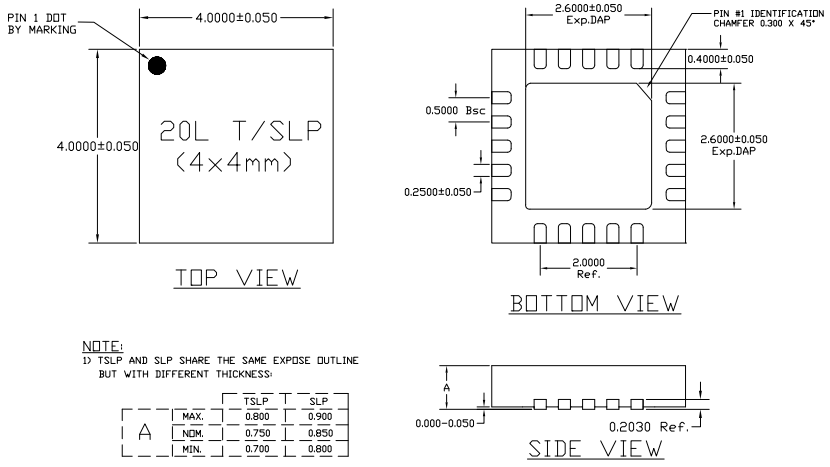
Selected Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Voltage Range	V_{dd}		1.8	3.0	3.6	V
Power Saving Modes	$I_{Shutdown}$	RC Oscillator, Main Digital Regulator, and Low Power Digital Regulator OFF	—	10	—	nA
	$I_{Standby}$	Register values retained, Main Digital Regulator and RC Oscillator OFF	—	400	—	nA
	I_{Sleep}	RC Oscillator ON, Register values retained, Main Digital Regulator OFF	—	800	—	nA
RX Mode Current	I_{RX}		—	18.5	—	mA
TX Mode Current (Si4432)	I_{TX_+20}	txpow[2:0] = 011 (+20 dBm), VDD = 3.3 V	—	80	—	mA
	I_{TX_+11}	txpow[2:0] = 000 (+11 dBm), VDD = 3.3 V	—	27	—	mA
TX Mode Current (Si4430/31)	I_{TX_+13}	txpow[2:0] = 111 (+13 dBm), VDD = 3.3 V	—	28	—	mA
	I_{TX_+1}	txpow[2:0] = 100 (+1 dBm), VDD = 3.3 V	—	16	—	mA
Synthesizer Frequency Range (Si4432/31)	$F_{SYNTH-LB}$	Low Band	240	—	480	MHz
	$F_{SYNTH-HB}$	High Band	480	—	930	MHz
Synthesizer Frequency Range (Si4430)	$F_{SYNTH-HB}$	High Band	900	—	960	MHz
Synthesizer Frequency Resolution	F_{RES-LB}	Low Band	—	156.25	—	Hz
	F_{RES-HB}	High Band	—	312.5	—	Hz
RX Sensitivity	P_{RX_2}	(BER < 0.1%) (2 kbps, GFSK, BT = 0.5, $\Delta f = \pm 5$ kHz)[2]	—	–118	—	dBm
RX Bandwidth	BW		2.6	—	620	kHz
Output Power Range (Si4432)	P_{TX}	Power control by txpow[2:0] Register	11	—	20	dBm
Output Power Range (Si4431/30)	P_{TX}	Power control by txpow[2:0] Register	–8	—	13	dBm
TX RF Output Steps	ΔP_{RF_OUT}	Controlled by txpow[2:0] Register	—	3	—	dB
Operating Ambient Temperature Range	T_A		–40		85	°C

Pin Assignments

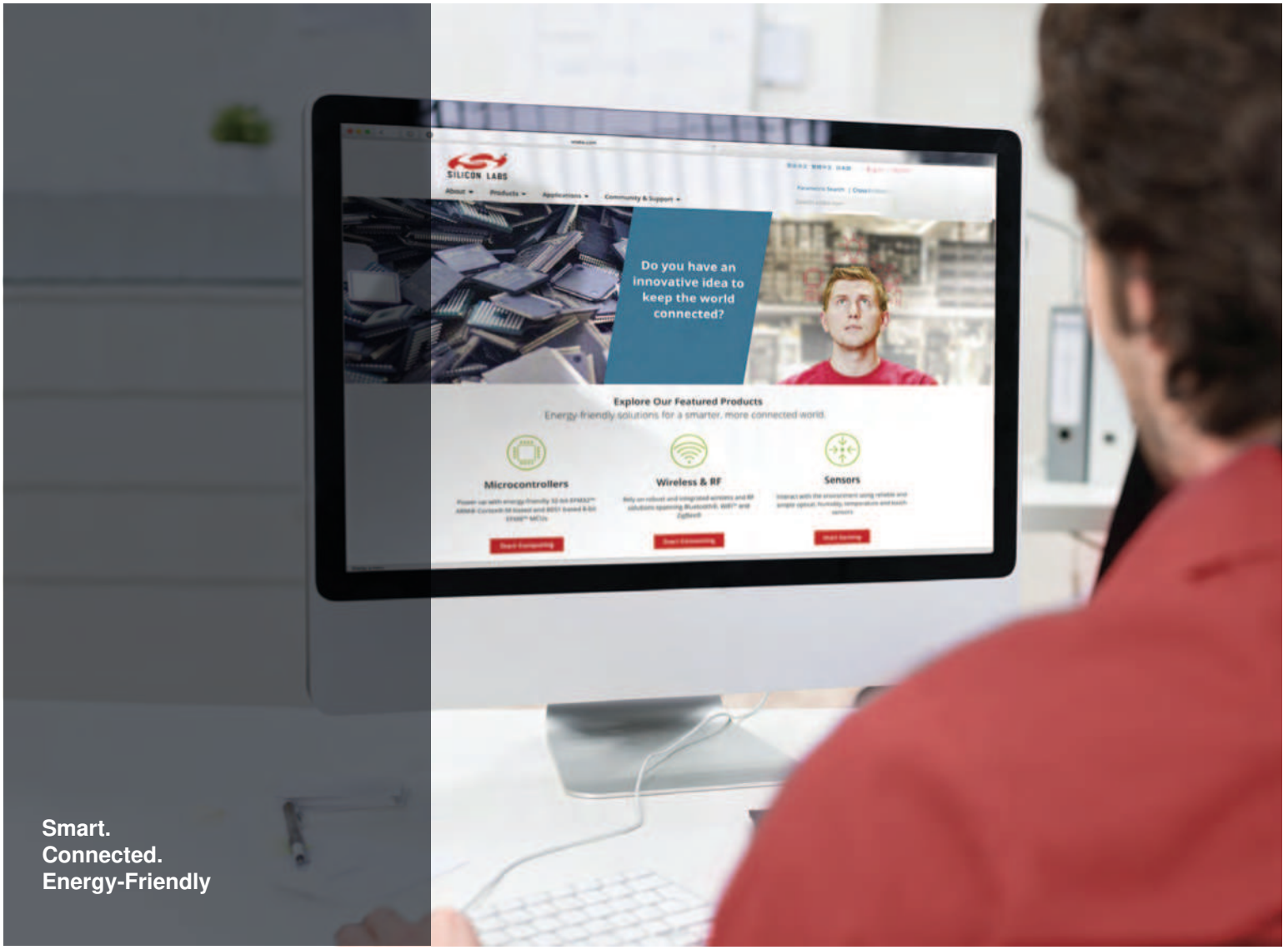


20-pin QFN Package Information



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