



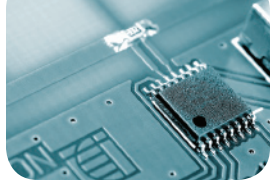
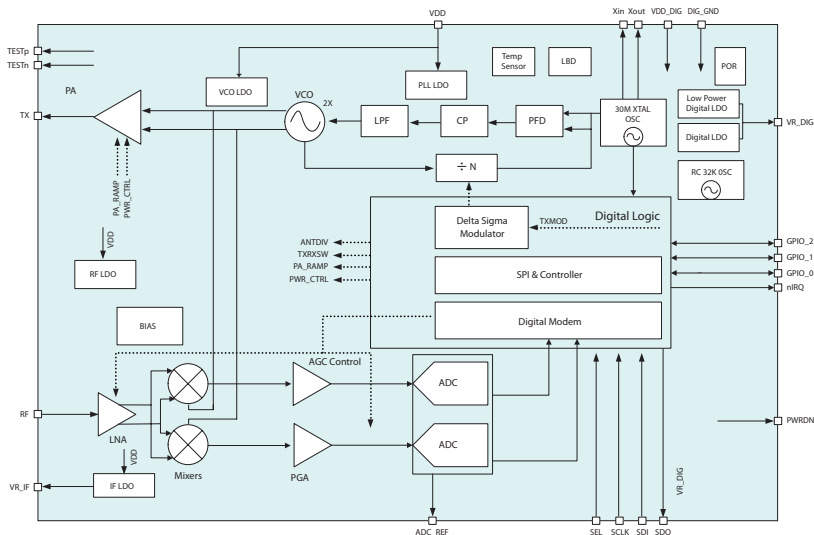
IA4431/32

Universal ISM Band Transceiver

DESCRIPTION

Integration's IA4431 and IA4432 transceivers are members of the new EZRadioPRO™ product family. While retaining all the attractive features of the earlier products such as high integration, low cost, flexibility, low BOM, and easy design-in, these parts are targeted to more sophisticated applications and offer several enhanced parameters and features, including continuous frequency coverage from 240-960MHz, and output power up to +20dBm. Also included are built-in features like wake-up timer, low battery detector, transmit and receive data FIFOs, power-on reset circuit, and general purpose digital I/Os. The chip incorporates a high performance ADC and digital modem which perform demodulation, filtering, and packet handling in the digital domain, making it ideal for configuration to multiple applications. These features simplify the task of the system designer and allow the use of lower-end microcontrollers. The 4432 has configurable output power from +11 to +20dBm and is ideal for Frequency Hopping Systems where maximum range is desired. The 4431 has configurable output power from -8 to +13dBm. Both the 4431 and 4432 comply with FCC and ETSI requirements when used in any of the standard ISM Bands. Only a 30MHz crystal and supply bypass capacitors are necessary as external components, making the devices ideal for high volume production in applications where size and cost are important.

FUNCTIONAL BLOCK DIAGRAM



PRODUCT FEATURES

- Frequency Range = 240-960MHz
- Sensitivity = -116dBm
- Data Rate = 1-128kbps
- +13dBm Max Output Power Version (Configurable -8 to +13dBm)
- +20dBm Max Output Power Version (Configurable +11 to +20dBm)
- Power Supply = 1.8-3.6V
- Ultra Low Power Sleep Mode
- Digital RSSI
- 20 Pin QFN Package
- On-chip Crystal Tuning
- Green Lead Free package
- Wake-On-Radio
- Auto-Frequency Calibration (AFC)
- Configurable Packet Structure
- Preamble Quality Detector
- TX & RX 64 byte FIFOs
- Low Battery Detector
- Low Power Consumption
 - 17mA Receive
 - 18mA Transmit @+10dBm
 - 60mA Transmit @+20dBm
- Low BOM
- -40°C - +85°C Temperature Range
- Integrated Voltage Regulators
- Antenna Diversity & TR Switch Control

TYPICAL APPLICATIONS

- Remote control
- Home security and alarm
- Wireless PC peripherals
- Toy control
- Remote keyless entry
- Tire pressure monitoring
- Telemetry
- Personal data logging
- Remote meter reading

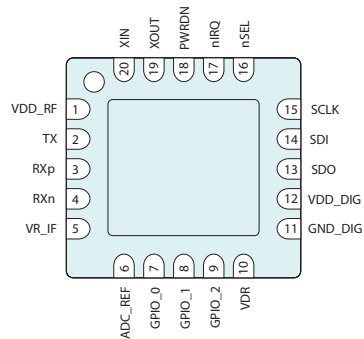


DC CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP IA4431 IA4432	MAX	UNITS
V_{DD}	Supply Voltage Range		1.8	3.3	3.6	V
V_{IH}	Digital Input Voltage High	TR_DATA, RESETn, SPI_DATA, SPI_CLK, CSn, GPIO_0, GPIO_1, GPIO_2	$V_{DD} - 0.4$			V
$I_{SHUTDOWN}$	SLEEP Mode Currents	RC Oscillator, Digital Regulator, and SLEEP Regulator OFF. Depends only on process leakage		100		nA
I_{STBY}		Sleep Regulator ON (Register values retained) and Digital Regulator, RC Oscillator OFF		325		nA
I_{SLP}		RC Oscillator and Sleep Regulator ON (Register values retained) and Digital Regulator OFF		625		nA
I_{READY}		Crystal Oscillator and Digital Regulator ON, all other blocks OFF		605		μ A
I_{TUNE}	TUNE Mode Current			8.5		mA
I_{RX}	RX Mode Current			17		mA
I_{TX}	TX Mode Current	(IA4431) — TXPWR[1:0] = '110' (+10dBm), VDD=3.3V, (IA4432) — TXPWR[1:0] = '11' (+20dBm), VDD=3.3V		18 60		mA
I_{TX_0}	TX Mode Current	TXPWR[1:0] = '011' (+1dBm), VDD=3.3V		10		mA
TS_A	Temperature Sensor Accuracy			± 5		$^{\circ}$ C
TS_S	Temperature Sensor Sensitivity			5		$^{\circ}$ C/mV

PIN DIAGRAM

QFN-20



RECEIVER AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
F_{SYNTH}	RX Frequency Range		240		960	MHz
P_{RX_2}	RX Sensitivity	(BER < 0.1%) (2 kbps, DF = ±5kHz)		-116		dBm
P_{RX_2}		(BER < 0.1%) (40 kbps, DF = ±20kHz)		-106		dBm
P_{RX_2}		(BER < 0.1%) (100 kbps, DF = ±50kHz)		-102		dBm
C/I_{1-CH}	±1-Ch Offset Selectivity (BER < 0.1%)	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5, channel spacing = 150kHz		-24		dB
C/I_{2-CH}	±2-Ch Offset Selectivity (BER < 0.1%)	Desired Ref Signal above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5, channel spacing = 150kHz		-59		dB
C/I_{3-CH}	≥ ±3Ch Offset Selectivity (BER < 0.1%)	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5, channel spacing = 150kHz		-49		dB
1M_{BLOCK}	Blocking at 1MHz	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5		-52		dB
2M_{BLOCK}	Blocking at 2MHz	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5		-54		dB
5M_{BLOCK}	Blocking at 5MHz	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5		-61		dB
10M_{BLOCK}	Blocking at 10MHz	Desired Ref Signal 3dB above sensitivity. Interferer and desired modulated with 40 kbps DF = 20kHz GFSK with BT = 0.5		-64		dB

TRANSMITTER AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN		TYP		MAX		UNIT
			IA4431	IA4432	IA4431	IA4432	IA4431	IA4432	
F_{SYNTH}	TX Frequency Range		240				960		MHz
P_{TX}	Output Power	For both High and Low Bands(240-960MHz), Output Power Controlled by TXPWR[2:0] Register	-8	+11	10	20	13	21	dBm
ΔP_{RF_OUT}	TX RF Output Steps	TXPWR[2:0] = '000' thru '111'			3				dB
ΔP_{RF_V}	TX RF Output Level Variation vs. Voltage	Measured from VDD=3V to VDD=2V			3				dB
ΔP_{RF_TEMP}	TX RF Output Level Variation vs. Temperature				2				dB
ΔP_{RF_FREQ}	TX RF Output Level Variation vs. Frequency	Measured across any one frequency band.			1				dB
P_{OB-TX1}	Spurious Emissions	< 1 GHz					-50		dBc
P_{OB-TX2}		1 GHz – 12.75 GHz					-70		dBc
P_{2HARM}	Harmonics				-42				dBc
P_{3HARM}					-42				dBc

SYNTHESIZER AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
$F_{\text{SYNTH-HB}}$	Synthesizer Frequency Range	Low Band	240		480	MHz
		High Band	480		960	MHz
ΔF_{HB}	Synthesizer Frequency Resolution	Low Band		156.25		Hz
		High Band		312.5		Hz
BR	Modulation Data Rate		1		128	kb/s
Δf_{FSK}	Modulation Deviation	At maximum PLL BW	± 1		± 159	kHz
t_{LOCK}	Synthesizer Settling Time	Measured from leaving SLEEP mode with XOSC running to any frequency		100		μs
$L\phi(f_M)$	Phase Noise	$\Delta F = 10 \text{ kHz}$		-80		dBc/Hz
		$\Delta F = 100 \text{ kHz}$		-85		dBc/Hz
		$\Delta F = 1 \text{ MHz}$		-110		dBc/Hz
		$\Delta F = 10 \text{ MHz}$		-130		dBc/Hz
$P_{\text{SPR_IB}}$	Spurious Emissions	In Band Spurious Emissions (Frac-N spurs)			-50	dBc
$P_{\text{SPR_REF}}$		Reference Frequency and Harmonics			-70	dBc
$P_{\text{SPR_TUNE}}$		Measured on commanded channel at RX or TX pins in TUNE Mode			-47	dBm



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