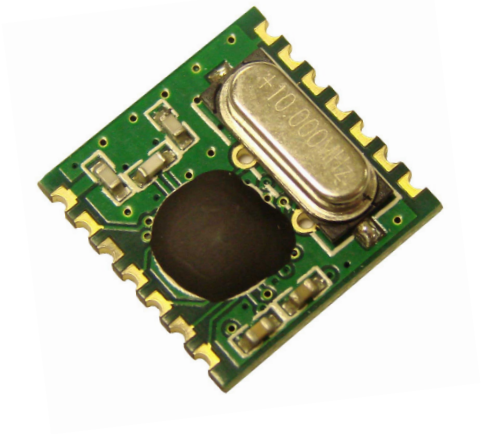
ALPHA RF MODULES

ALPHA-TX
ALPHA-RX

- FM Transmitter & Receiver Modules
- Available as 433 or 915MHz
- Transmit Range up to 300m
- Miniature SMT Packages
- Data Rate up to 256Kbps
- Programmable Output Power
- 2.2 – 5.4Vdc Operating Voltage
- Standby Current <300nA
- Programmable Freq Deviation
- SPI Interface (for Config)
- Clock and Reset Signal for External MCU
- Wakeup Timer
- Automatic Antenna Tuning
- Differential Antenna Output
- Low Battery Detection
- EMC Compliant , FCC Compliant
- Operates from -45 to +85°C



Transmitter

- 3-12 Supply Voltage
- Programmable Output Power

Receiver

- Standby current < 0.3uA
- Wake up timer function
- PLL Design
- Analog and Digital Signal Strength indicator
- Programmable receive bandwidth (67 to 400KHz)

Applications

- Wireless Security Systems
- Car Alarms
- Remote Gate Controls
- Remote Sensing
- Data Capture
- Sensor Reporting

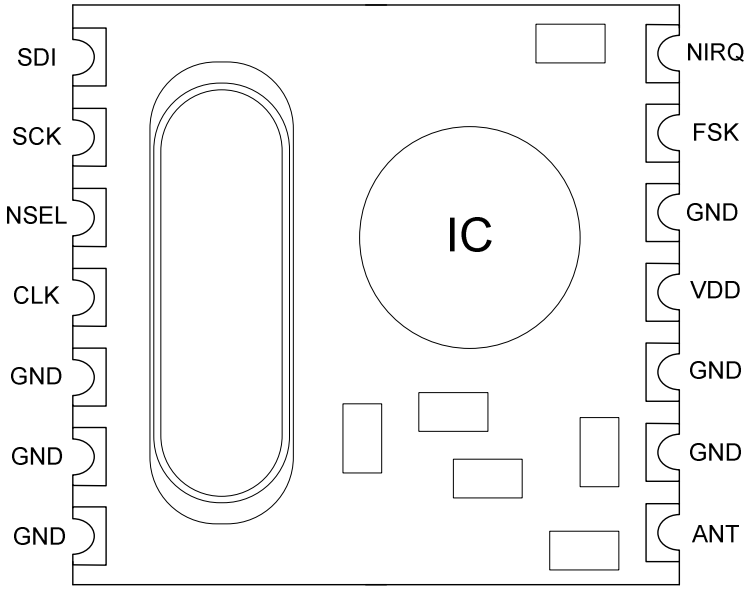
Introduction

The Alpha Modules are extremely cost effective but high performance radio modules. Supplied in a miniature Surface mount package these modules can Transmit/Receive at upto 115Kbps at upto 300m range.
Operating at 2-5V, both transmitter and receiver monitor their battery voltage and can sleep with very low standby current. The modules can wake intermittently and provide direct control outputs to a microcontroller, ideally suited to battery applications. (Especially receivers!)
These Modules will suit one to one multi-node wireless links in applications including car and building security, POS and inventory tracking, remote process monitoring.

Part Numbers

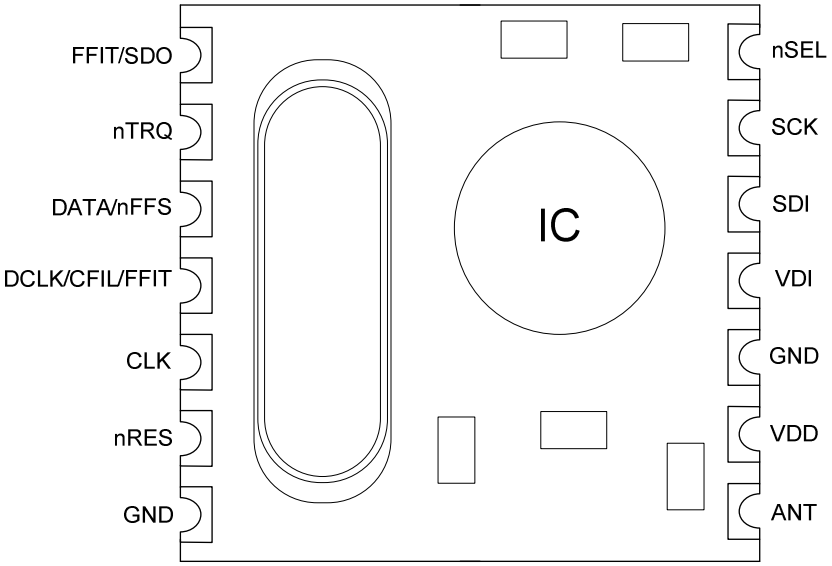
Part Number	Description
ALPHA-TX433S	FM Transmitter Module, 433MHz
ALPHA-RX433S	FM Receiver Module, 433MHz
ALPHA-TX915S	FM Transmitter Module, 915MHz
ALPHA-RX915S	FM Receiver Module, 915MHz

Transmitter Pin Description



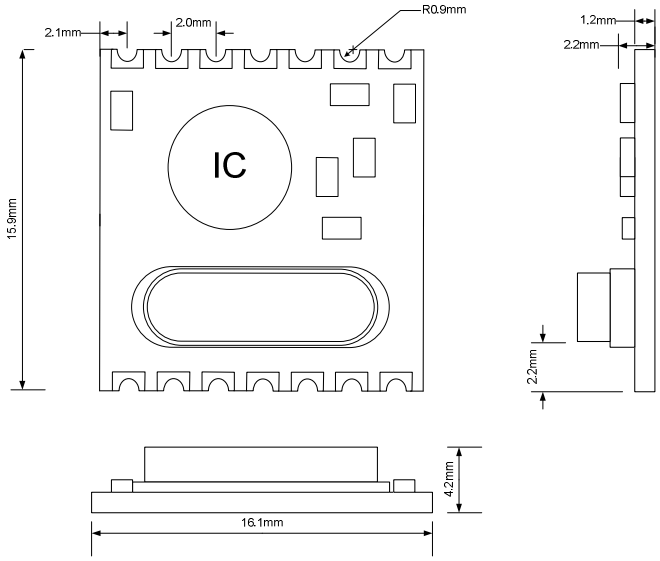
Pin		Type	Description
9	FSK	IN	FSK Data Input
4	CLK	OUT	Clock out for MCU (1-10MHz)
11	VDD	IN	Positive Power Supply
8	nIRQ	OUT	Interrupt Request Out (Active Low)
1	SDI	IN	SPI Data Input
2	SCK	IN	SPI Clock Input
3	nSEL	IN	Chip select (Active Low)
14	ANT	OUT	Antenna Connection
5-7, 10,12,13	GND	-	Ground Connection

Receiver Pin Description

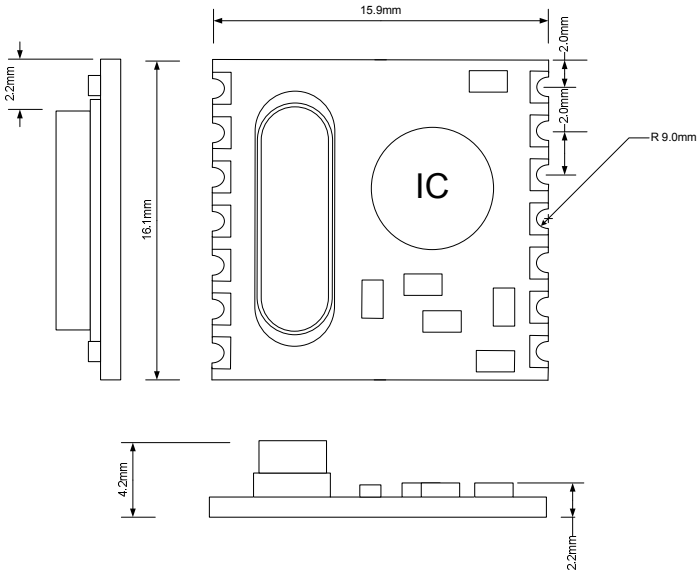


Pin		Type	Description
11	VDI		FSK Data Input
13	VDD		Positive Power Supply
10	SDI		SPI Data Input
9	SCK		SPI Clock Input
8	nSEL		Chip select (Active Low)
4	FFIT/SDO		FIFO fill interrupt (Active Low) / status read data output
6	nRES		Clock out for MCU (1-10MHz)
7,12	GND		Ground Connection
	nIRQ		Interrupt Request Output (Active Low)
	DATA/CFIL/FFIT		Clock Output (noFIFO) / External filter Capacitor(analog mode) / FIFO interrupt (active High) when FIFO level set to 1, FIFO Empty interruption can be achieved.
	CLK		Clock Output for external microcontroller

Transmitter Mechanical Dimensions



Receiver Mechanical Dimensions



Receiver Technical Specifications

Maximum Ratings (not Operating)

Symbol	Parameter	Minimum	Maximum	Unit
V_{DD}	Positive Supply	-0.5	6.0	V
V_{IN}	All pin input level	-0.5	Vdd +0.5	V
I_{IN}	Input current except power	-25	+25	mA
T_{ST}	Storage Temp	-55	125	°C
T_{ID}	Soldering Temp		260	°C

Maximum Working Range

Symbol	Parameter	Minimum	Maximum	Unit
V_{DD}	Positive Supply	2.2	5.4	V
T_{OP}	Operating Temp	-40	85	°C

DC Characteristics

Symbol	Parameter	Min	Typical	Max	Unit
I_{DD}	Current Consumption @ 433		9	11	mA
	@ 915		10.5	12.5	
I_X	Stand by Current		3.0	3.5	mA
I_{PD}	Sleep Mode Current		0.3		uA
I_{LB}	Low Battery Detection		0.5		uA
V_{LB}	Low Battery Step (0.1V steps)	2.2		5.3	V
V_{LBA}	Low Battery accuracy		75		mV
V_{IL}	Low Level Input			0.3 x V_{DD}	V
V_{IH}	High Level Input	0.7 x V_{DD}			V
I_{IL}	Leakage Current, V_{IL} = 0V	-1		1	uA
I_{IH}	Leakage Current, V_{IH} = V_{DD}, V_{DD} = 5.4V	-1		1	uA
V_{OL}	Low Level output, I_{OL} = 2mA			0.4	V
V_{OH}	High Level output, I_{OH} = 2mA	V_{DD}-0.4			V

AC Characteristics

Symbol	Parameter		Min	Typical	Max	Unit
F_{LO}	Frequency	@433MHz	430.24		439.75	MHz
		@915MHz	900.72		929.27	
BW	Bandwidth	1	60	67	75	KHz
		2	120	134	150	
		3	180	200	225	
		4	240	270	300	
		5	300	350	375	
		6	360	400	450	
T_{LOCK}	PLL Lock time, after 10Mhz step hopping.			20		uS
$T_{ST,P}$	PLL Start time, after crystal stabilised			250		uS
BR	Data Rate				115.2	Kbps
P_{MIN}	Sensitivity	@433MHz		-109	-100	dBm
		@915MHz		-105	-98	
RS_A	RSSI Accuracy		-5		+5	dB
RS_R	RSSI Range			46		dB
RS_{STEP}	RSSI Programmable Step			6		dB
RS_{ARSSI}	ARSSI Filter			1		nF
RS_{RESP}	DRSSI Response Time, C			500		us
C_{XL}	Capacitor Bank		8.5		16	pF
T_{POR}	PWR time, power up time (V_{DD} to 90%)			50	100	mS
T_{PBT}	Wake up timer period		.96		1.08	mS
T_{WAKEUP}	Programmable Wake up time		1		$5x10^{11}$	mS

Transmitter Technical Specifications

Maximum Ratings (not Operating)

Symbol	Parameter	Minimum	Maximum	Unit
V_{DD}	Positive Supply	-0.5	6.0	V
V_{IN}	All pin input level	-0.5	Vdd +0.5	V
I_{IN}	Input current except power	-25	+25	mA
T_{ST}	Storage Temp	-55	125	^{o}C
T_{ID}	Soldering Temp		260	^{o}C

Maximum Working Range

Symbol	Parameter	Minimum	Maximum	Unit
V_{DD}	Positive Supply	2.2	5.4	V
T_{OP}	Operating Temp	-40	85	^{o}C

DC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
I_{DD}	Current Consumption @ 433MHz @ 915MHz @ 0dBm Power output		12 15		mA
I_{DD}	Current Consumption @ max power output		23		mA
I_{PD}	Sleep Mode Current		0.3		uA
I_{WT}	Wake up timer consumption		1.5		uA
I_{LB}	Low Battery Detector Current		0.5		uA
I_X	Idle Mode (crystal only)		1.5		mA
V_{LB}	Low Battery Detect range (0.1V steps)	2.2		5.3	mV
V_{IL}	Low Level Input			0.3 x V_{DD}	V
V_{IH}	High Level Input	0.7xV_{DD}			V
I_{IL}	Leakage Current, V_{IL} = 0V	-1		1	uA
I_{IH}	Leakage Current, V_{IH} = V_{DD}, V_{DD} = 5.4V	-1		1	uA
V_{OL}	Low Level output, I_{OL} = 2mA			0.4	V
V_{OH}	High Level output, I_{OH} = 2mA	V_{DD}-0.4			V

AC Characteristics

Symbol	Parameter	Minimum	Typical	Maximum	Unit
F_{REF}					
F_O	Frequency @433MHz 2.5KHz Step @915MHz 7.5KHz Step	430.24 900.72		439.75 929.27	MHz
T_{LOCK}	PLL Lock time, after 10Mhz step hopping.		20		uS
T_{SP}	PLL Start time, after crystal stabilised			250	uS
P_{MAX}	Max Available Power Output @433MHz @915MHz	5 2	7 4		dBm
Q_O	Q Factor of Output capacitance	16	18	22	
BR_{FSK}	FSK Data Rate			115.2	kbps
DF_{FSK}	FSK Deviation, 30KHz step	30		210	KHz
T_{PBT}	Period for Wake Up timer	0.95		1.05	mS
T_{WAKEUP}	Wake Up Timer	1		$2x10^9$	mS
T_{PQR}	Power up time		100		mS

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