

## Multi channel UHF FM Class 1 Social Alarm Receiver

**The SAR3 is a miniature PCB mounting UHF radio data receiver. It is a narrowband 25KHz spacing receiver incorporating a received signal strength indicator (RSSI) and 4 channel capability. It allows the simple implementation of data links at speeds up to 8kbps.**



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Figure 1: SAR3-869-8

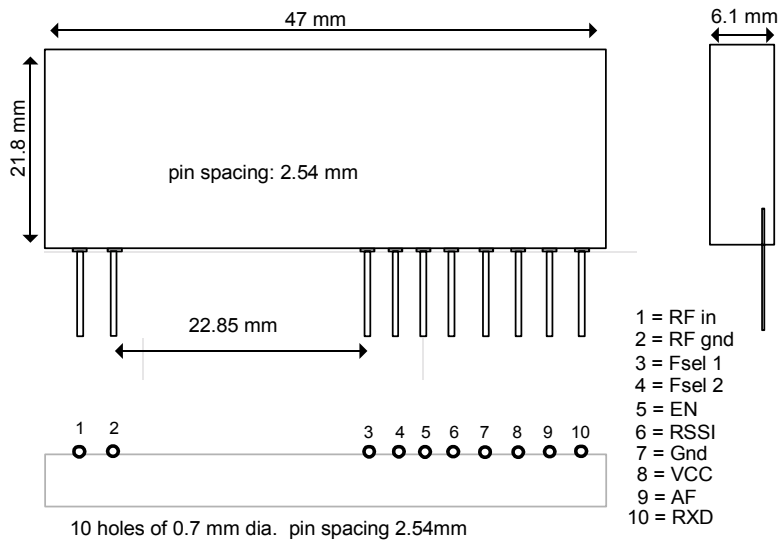
Available for operation in European 868MHz band, the SAR3 combines full screening with internal filtering to ensure EMC compliance by minimising spurious radiation and susceptibility. The module suits one-to-one and multi-node wireless links in applications including automatic meter reading (AMR), car and building security, Social alarms, EPOS and inventory tracking and remote industrial process monitoring.

### Features

- Designed to comply with harmonised radio standard EN 300 220-3
- Designed to comply with harmonised EMC standard EN 301 489-3
- Class 1 performance (as per EN 300-220 V2.3.1)
- Data rates up to 8kbps
- 4 pre programmed 869MHz band social alarm frequencies as standard
- Versions available on any frequency from 868 to 869MHz
- Fully screened
- 4 channel selectable

### Technical Summary

- Double conversion FM superhet
- SAW front end filter gives >65dB image rejection
- Operation from 4V to 16V @ 46mA typical
- Built-in regulator for improved stability and supply noise rejection
- -115dBm sensitivity @ 1ppm BER
- RSSI output with 65dB range



**Fig. 2: Physical dimensions**

## Pin description

### RF IN pin 1

50 Ohm input from the antenna, DC isolated.

### RF GND pin 2

RF ground pin, internally connected to the module screen and pin 7 (GND). This pin should be connected to the RF return path (coax braid, main PCB ground plane etc.)

	<u>FSEL 1</u>	<u>FSEL 2</u>	<u>STANDARD FREQUENCIES</u>
<b>FSEL 1 pin 3 Internal 10K pullup</b>	1	1	869.2125MHz (Fsel 1 and 2 open cct.)
	1	0	869.2375 MHz
<b>FSEL 2 pin 4 Internal 10K pullup</b>	0	1	868.650 MHz
	0	0	869.675 MHz

### En pin 5

Rx enable. <0.15V shuts down module (current <1uA). >1.7V enables the receiver. Impedance ~1Mohm.

### RSSI pin 6

Received signal strength indicator with 65dB range. See page 5 for typical characteristics.

### 0V pin 7

DC supply ground. Internally connected to pin 2 and module screen.

### Vcc pin 8

DC supply. Max ripple content 0.1Vp-p.

### AF out pin 9

Buffered and filtered analogue output from the FM demodulator. Standing DC bias 1.0V approx. External load should be >10kΩ // <100pF.

### RXD pin 10

Digital output from the internal data slicer. The data is a squared version of the signal on pin 9 (AF) and is true data, i.e. as fed to the transmitter. Output is "open-collector" format with internal 47kΩ pull-up to Vcc (pin 8).

## Absolute maximum ratings

Exceeding the values below may cause permanent damage to the module.

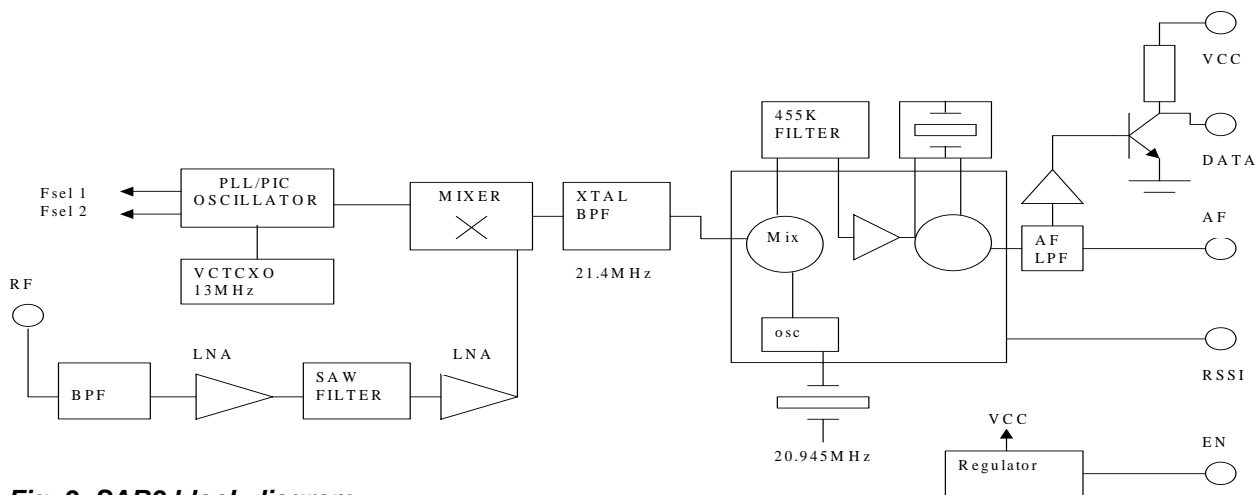
Operating temperature	-20°C to +55°C
Storage temperature	-40°C to +100°C
Vcc (pin 8)	-0.3V to +16V
RSSI, AF, RXD (pins 6, 9, 10)	-0.1V to +3V
RF IN (pin 1)	±50V DC, +10dBm RF

## Performance specifications

Figures apply to standard version @ Vcc=5.0V, temperature +20°C, unless stated.

General	pin	min.	typ.	max.	units	notes
Supply voltage	8	4	5	16	V	
Supply current	8	-	46	55	mA	
<b>RF/IF</b>						
RF sensitivity for 12dB (S+N/N)	1, 2	-118	-120	-	dBm	1, 2
RF sensitivity for 1ppm BER	1, 2	-	-115	-	dBm	1, 2
RSSI range	1, 2	-	65	-	dB	
IF bandwidth	-	-	15	-	kHz	
Image rejection (f <sub>RF</sub> -21.4MHz)	1	-	65	-	dB	
LO leakage, conducted	1	-54	-65	-	dBm	
Adjacent channel rejection		-44	-	-	dBm	
Blocking		-20	-10	-	dBm	
Blocking (relative)			100		dB	
<b>Baseband</b>						
Baseband bandwidth @ -3dB	9	0	-	4.5	kHz	
AF level	9	600	700	800	mV p-p	1
DC offset on AF output	9	0.65	0.95	1.5	V	
Distortion on recovered AF	9	-	4	6	%	1, 2
Load capacitance, AF & RXD	9	-	-	100	pF	
<b>Dynamic Timing</b>						
<i>Rx power up with signal present</i>						
Power up to valid RSSI, t <sub>PU-RSSI</sub>	8	-	40	55	ms	
Power up to stable data, t <sub>PU-data</sub>	10	-	40	55	ms	
<i>Signal applied with Rx on</i>						
RSSI response time (rise/fall)	1, 6	-	1	-	ms	
Signal to stable data, t <sub>sig-data</sub>	10	-	1	-	ms	

**Note:** 1. For received signal with ±3kHz FM deviation 1kHz tone  
2. Typical figures are for signal at centre frequency



**Fig. 3: SAR3 block diagram**

### Power supply requirement

The SAR3 incorporates a built-in regulator which delivers a constant 4.0V to the module circuitry when the external supply voltage is 4V or greater, with 40dB or more of supply ripple rejection. This ensures constant performance up to the maximum permitted supply rail and removes the need for external supply decoupling except in cases where the supply rail is extremely poor (ripple/noise content >0.1Vp-p).

Note, however, that for supply voltages lower than 4V the regulator is effectively inoperative and supply ripple rejection is considerably reduced. Under these conditions the ripple/noise on the supply rail should be below 10mVp-p to avoid problems. If the quality of the supply is in doubt, it is recommended that a 10mF low-ESR tantalum or similar capacitor be added between the module supply pin (Vcc) and ground, together with a 10W series feed resistor between the Vcc pin and the supply rail.

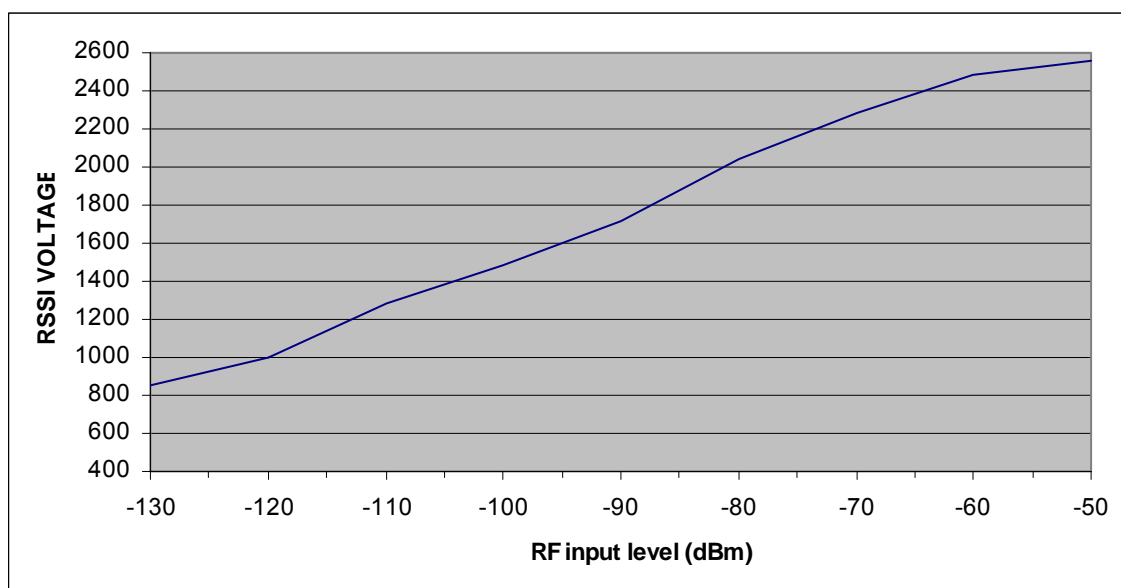
### Received Signal Strength Indicator (RSSI)

The module incorporates a wide range RSSI which measures the strength of an incoming signal over a range of approximately 65dB. This allows assessment of link quality and available margin and is useful when performing range tests.

The output on pin 6 of the module has a standing DC bias in the region of 0.8V with no signal, rising to around 2.5V at maximum indication. The RSSI output source impedance is high (~100kΩ) and external loading should therefore be kept to a minimum.

Typical RSSI characteristic is as shown below:

**Typical RSSI characteristic is shown below (this is for indicative purposes only and is not a guarantee of actual RSSI characteristics):**



**Fig. 4: Typical RSSI response**

## Module mounting considerations

The module may be mounted vertically or bent horizontal to the motherboard. Good RF layout practice should be observed – in particular, any ground return required by the antenna or feed should be connected directly to the RF GND pin at the antenna end of the module, and not to the OV pin which is intended as a DC ground only. All connecting tracks should be kept as short as possible to avoid any problems with stray RF pickup.

If the connection between module and antenna does not form part of the antenna itself, it should be made using 50Ω microstrip line or coax or a combination of both. It is desirable (but not essential) to fill all unused PCB area around the module with ground plane.

The module may be potted if required in a viscous compound which cannot enter the screen can.

**Warning:** *DO NOT wash the module. It is not hermetically sealed.*

## Ordering Information:

**SAR3-869-8** (869.2125MHz, 869.2375 MHz, 868.650 MHz and 869.675 MHz)

The SAR3 receiver is also available on other frequencies within the 868 – 869MHz band. Please contact sales department for further details.

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The Intrastat commodity code for all our modules is: 8542 6000.

### R&TTE Directive

After 7 April 2001 the manufacturer can only place finished product on the market under the provisions of the R&TTE Directive. Equipment within the scope of the R&TTE Directive may demonstrate compliance to the essential requirements specified in Article 3 of the Directive, as appropriate to the particular equipment.

Further details are available on The Office of Communications (Ofcom) web site:

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