



## **ELECTRONICS TOMORROW LTD.**

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### Model 8373 ( Receiver )

This unit is powered by 2 AA size batteries, once you insert the batteries into the unit, it will start to operate.

You can find 7 push buttons and 3 slide switches on the unit, they are Month/Hour, Date/Minute, Year/12/24 hour, Re-Sync, C/F, wave and reset button, also Lock/Time set/ Calendar switch, PST/MST/CST/EST switch and DST ON/OFF switch.

When you slide the Lock/Time Set/ Calendar to Time set or Calendar, the Month/Hour, Date/Minute, Year/12/24 hour buttons are used to set the desired time and date, if the Lock/Time set/Calendar switch in Lock position, the Year/12/24 hour button used to toggle between 12HR or 24HR display format.

For the Re-Sync button, once you press the button, it will force the unit to start receive signal for 6 minutes, once it receive a correct signal and demodulate the signal correctly, the unit will turn off the receiver in order to save the power. The receiver will be turned on again after 3 minutes for last success reception. During receiving signal, IC:RX3310A is used to demodulate the signal.

You can reset the unit by pressing the reset key once you found that the unit does not working properly, once you press the reset key, all setup will be reset also, it include time and date.

Also you can switch between C/F reading by press the C/F switch to your desired unit.

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## Description

The RX3310A is a fully integrated, amplitude-shift-keying (ASK) modulation, single chip receiver. It is designed to operate in a variety of low power radio applications. All popular radio frequencies from 250 MHz to 450 MHz may be supported by simply choosing the appropriate external components. Particular emphasis has been placed on low current consumption. Average current consumption is 2.6 mA in normal operation mode and 25  $\mu$ A in power down mode under VCC=3.0volts.

## Features

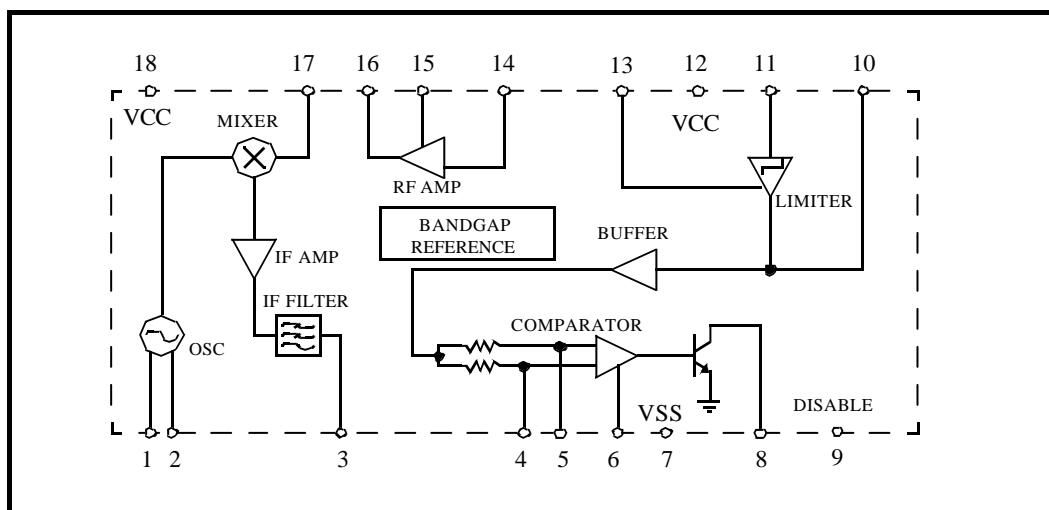
- ◆ Wide frequency range: 250 MHz to 450 MHz
- ◆ High sensitivity
- ◆ Low power consumption
- ◆ Automotive temperature range
- ◆ High integration level requiring few and inexpensive external components

## Applications

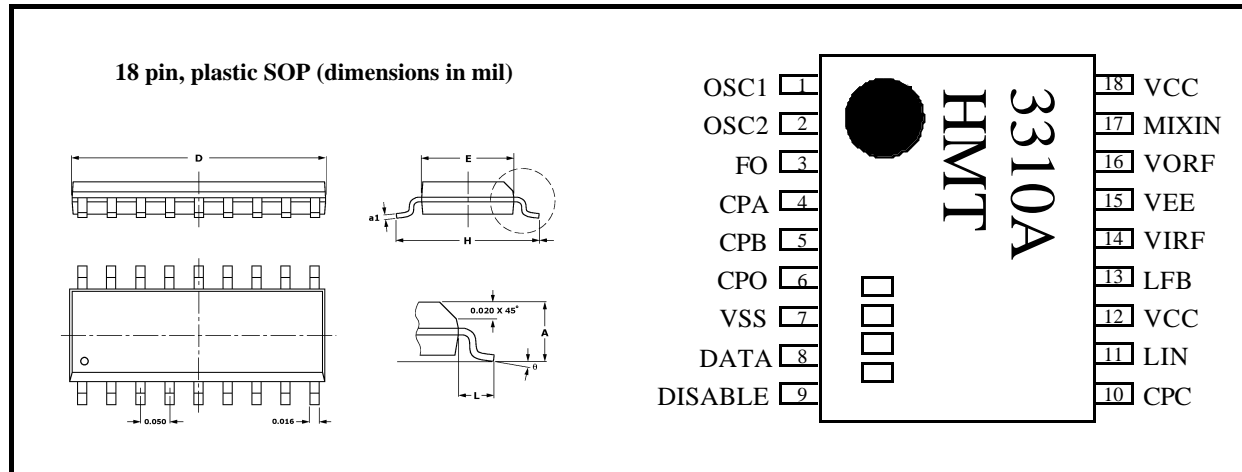
- ◆ Remote control systems
- ◆ Car alarm and other security systems
- ◆ Baby finder, wireless doorbell, wireless toys

## Block Diagram

RX3310A



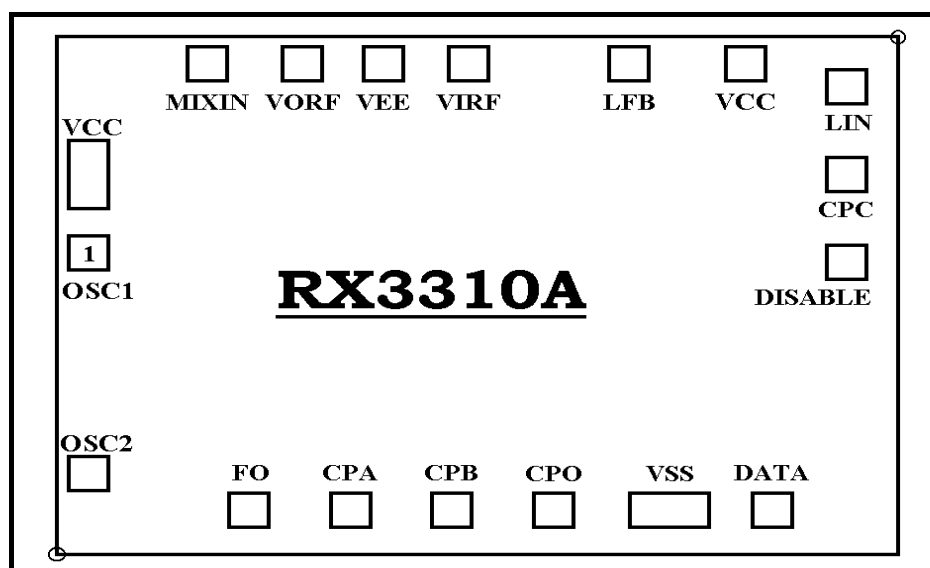
## SOP Package and Pin Assignment



Package Dimensions (300 mil body width)

Symbol	min.	typ.	max.	Unit
A	94	99	104	mil
a1	4		12	mil
D	447	450	460	mil
E	291	295	299	mil
H	394	406	418	mil
L	16	34	50	mil
θ	0		8	

## RX3310A Chip Window



## Pin Descriptions

Number	Name	I/O	Description
1	OSC1	IO	Oscillator tank connection
2	OSC2	IO	Oscillator tank connection
3	FO	O	IF filter output
4	CPA	I	Comparator input A
5	CPB	I	Comparator input B
6	CPO	I	Comparator offset adjustment
7	VSS	GND	Ground
8	DATA	O	Data output
9	DISABLE	I	Disable input. See <i>Electrical Characteristics (cont.)</i> on page 5
10	CPC	I	Comparator input C
11	LIN	I	Limiter input
12	VCC	POWER	Positive supply voltage
13	LFB	IO	Limiter feedback B
14	VIRF	I	RF amplifier input (requires external ac decoupling capacitor)
15	VEE	GND	Ground for RF amplifier
16	VORF	O	RF amplifier output
17	MIXIN	I	Mixer input (requires external ac decoupling capacitor)
18	VCC	POWER	Positive supply voltage

## Absolute Maximum Ratings

$$V_{SS} = 0 \text{ V}$$

Parameter	Symbol	Rating	Unit
Supply voltage	$V_{CC}$	$V_{SS} - 0.3$ to $V_{SS} + 6.0$	V
Operating temperature range	$T_{OPR}$	-60 to 85	°C
Storage temperature range	$T_{STG}$	-60 to 125	°C
Soldering temperature range	$T_{SLD}$	255	°C
Soldering time range	$t_{SLD}$	10	s

## Recommended Operating Conditions

$$V_{SS} = 0 \text{ V}$$

Parameter	Symbol	Value			Unit
		min.	typ.	max.	
Supply voltage range	$V_{CC}$	2.0	3.0	6.0	V
Operating temperature	$T_A$	-40	25	85	°C

## Receiver Characteristics

( $V_{CC} = 2.0$  to  $6.0$  V, **LO-RF=1.8MHz**, All tests at  $T_A = 25$  °C unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			min.	typ.	max.	
Sensitivity	$P_{sens}$	$V_{CC} = 3.0$ V, $T_A = 27$ °C, $BER \leq \frac{3}{100}$ , 9600 bps		-106	-100	dBm
Maximum input power	$P_{in,max}$			0	+3	dBm
Receiver turn-on time	$t_{ON}$				10	ms

## Electrical Characteristics

( $V_{CC} = 3.0$  V,  $V_{SS} = 0$  V, All tests at  $T_A = 25$  °C unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			min.	typ.	max.	
Supply current	$I_{CC}$			2.5	2.6	mA
Standby current	$I_{CC, sb}$	DISABLE = high		25	45	μA
Disable pin input logic high <sup>a</sup>	$V_{DIH}$		2.0	2.4		V
Disable pin input logic low <sup>a</sup>	$V_{DIL}$				0.8	V
Data output logic high	$V_{OH}$		$V_{PP}^b - 0.3$ V			V
Data output logic low	$V_{OL}$				0.3	V

a. Note: If the Disable pad is connected to an off-chip signal (open), then the pad is internally grounded.

b. Note:  $V_{PP}$  is the pull-up voltage for open collector data output. It may be as high as 13 V.

## Electrical Characteristics (cont.)

( $V_{CC} = 5.0\text{ V}$ ,  $V_{SS} = 0\text{ V}$ , All tests at  $T_A = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Condition	Value			Unit
			min.	typ.	max.	
Supply current	$I_{CC}$			4.5	5.0	mA
Standby current	$I_{CC, sb}$	DISABLE = high		35	50	$\mu\text{A}$
Disable pin input logic high	$V_{DIH}$		2.0	2.4		V
Disable pin input logic low	$V_{DIL}$				0.8	V
Data output logic high	$V_{OH}$		$V_{PP}^a - 0.3\text{ V}$			V
Data output logic low	$V_{OL}$				0.3	V

- a. Note: If the Disable pad is not connected to an off-chip signal (open), then the pad is internally grounded.  
b. Note:  $V_{PP}$  is the pull-up voltage for open collector data output. It may be as high as 13 V.

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## **Functional Description**

### **RF amplifier**

The RF amplifier uses a common emitter configuration with a separate emitter connection (VEE). The input signal (VIRF) should be ac-coupled externally. The output of the amplifier is open collector so that the gain may be set with an external tuned load.

### **Mixer**

The mixer is doubly-balanced configuration and has an ac-coupled input.

### **Oscillator**

A balanced oscillator configuration is used with an L-C tank externally connected across the OSC1 and OSC2 pins. The frequency of the oscillator is determined by the external capacitor, C1, and inductor, L1 (please refer to application circuit schematic).

### **IF amplifier**

The IF amplifier is a differential input, single-ended output emitter-coupled pair. It is used to provide additional gain in order to reduce the influence of the noise of the succeeding limiter amplifier on the total receiver noise figure.

### **IF filter**

To minimize external component costs, an active IF filter is fully integrated.

### **Limiter**

The limiting amplifier consists of several dc-coupled amplifier stages and outputs an RSSI signal.

### **Comparator**

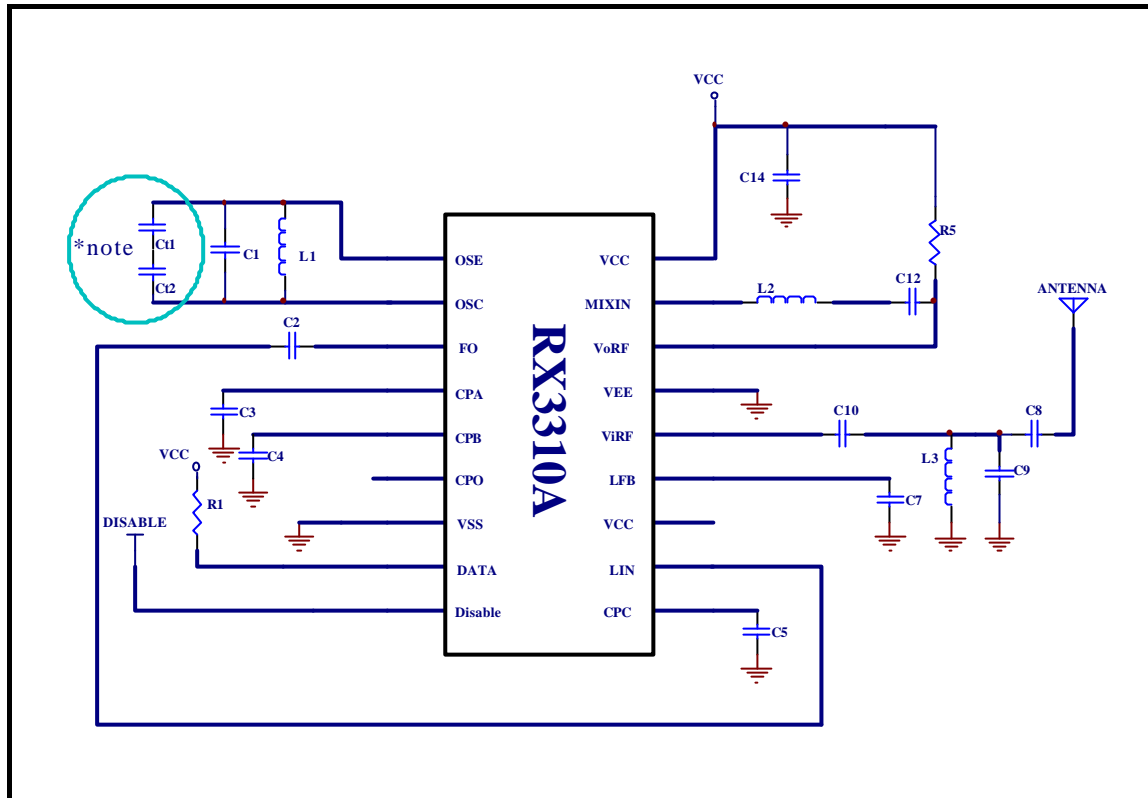
Following the limiting amplifier, the RSSI signal is passed through an additional buffer stage and is then fed to the comparator positive and negative terminals, which possess different R-C filter time constants. A larger off-chip capacitor is used at the negative comparator input and hence, its terminal voltage represents the average value of the RSSI signal. A smaller off-chip capacitor is used at the positive comparator input and this allows the positive input to follow the RSSI signal instantaneously. When the received RSSI signal exceeds its average value (when an ASK on signal is received), the comparator output is switched on.

### **Band gap reference**

A band gap reference provides precise biasing of the entire chip over temperature.



## Application Circuit



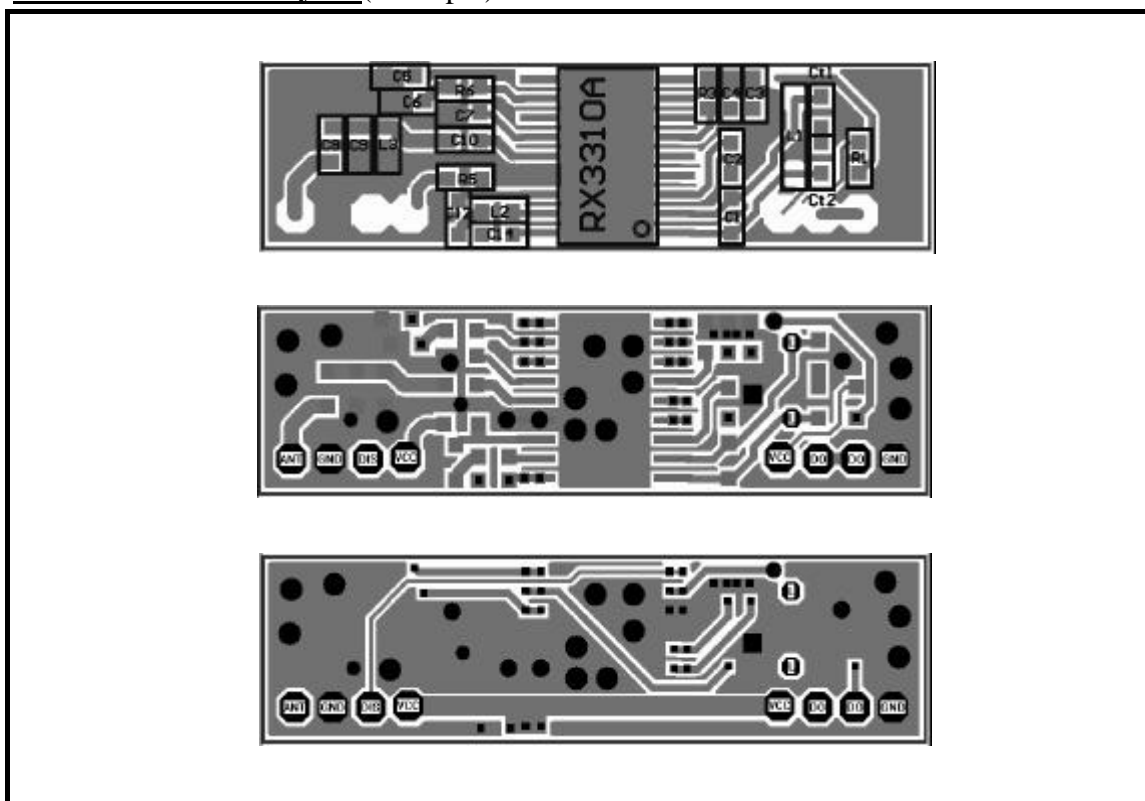
\* note: Ct1, Ct2 are added for the temperature compensation. Not necessary.

## External Components

Component	Frequency Band (MHz)				Unit	Tolerance	Remark
	303	315	418	434			
C1	6.8	6.8	6.8	5.6	pF	+/-0.5pF	TC=NPO
C2	68	68	68	68	pF	+/-5 %	TC=NPO
C3	470	470	470	470	pF	+/-10 %	TC=X7R
C4	1	1	1	1	μF	+/-10 %	TC=Y5V
C5	470	470	470	470	pF	+/-10 %	TC=X7R
C7	10	10	10	10	nF	+/-10 %	TC=X7R
C8	2.2	1.8	1.8	1.5	pF	+/-0.25pF	TC=NPO
C9	1.8	1.5	1.2	1.2	pF	+/-0.25pF	TC=NPO
C10	22	18	22	10	pF	+/-5%	TC=NPO
C12	82	82	82	82	pF	+/-5 %	TC=NPO
C14	1	1	1	1	μF	+/-10 %	TC=Y5V
Ct1	3	3	3	3	pF		GRM4DUJ030C50
Ct2	8.2	8.2	8.2	8.2	pF		TC=NPO
R1	100	100	100	100	KΩ	+/-5 %	TC=+/-200 ppm
R5	1	1	1	1	KΩ	+/-5 %	TC=+/-200 ppm
L1	2.5	2.5	1.5	1.5	T		tunable
L2	100	100	100	82	nH		
L3	33	33	18	18	nH		

note: All components are SMD 0805 type.

### Evaluation Board Layout(Example)



1. From top to bottom: Component side of printed-circuit board, top side, bottom side.
2. Copy this page by the factor of 50%, the real size printed-circuit board is available. (Real-size: 11.8mm\*43.5mm)
3. Suggested board material: FR4, thickness: 0.8mm