

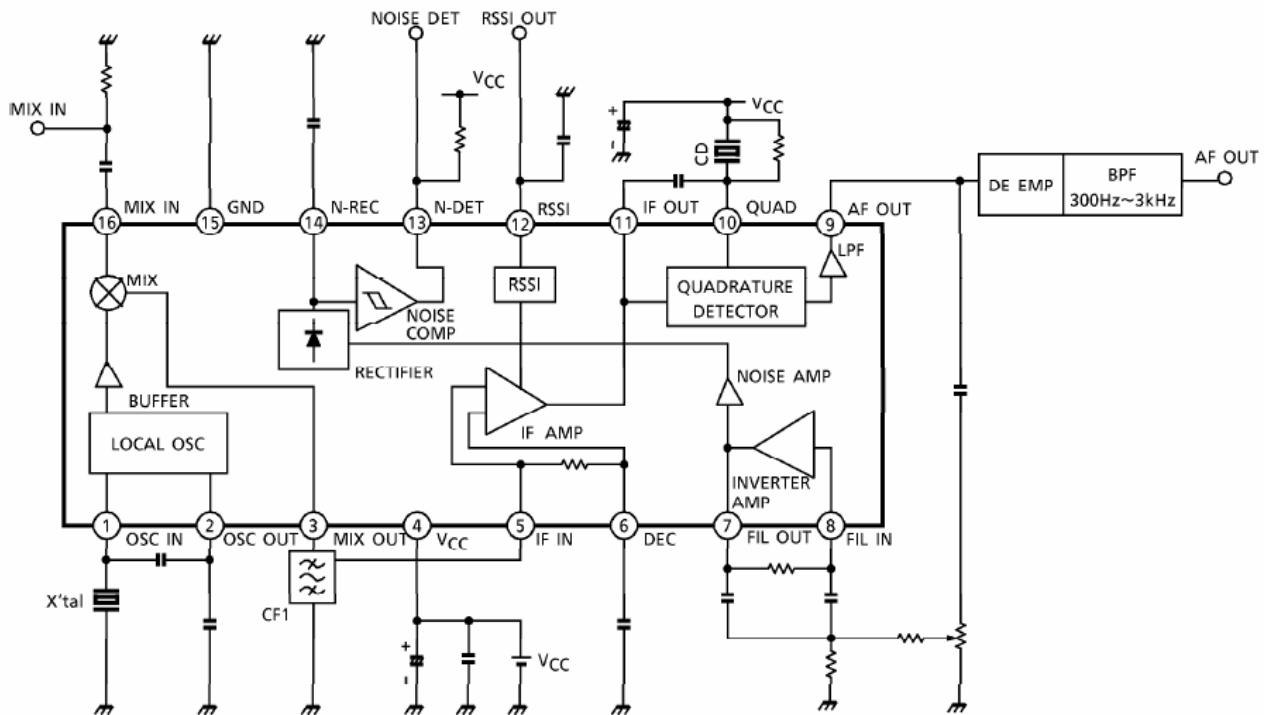
TA31136 RSSI OUTPUT ZEROIZER

By
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The TA31136 FM Detector Integrated Circuit from Toshiba is used in many modern FM ham rigs. This includes mobiles from Kenwood, Icom, and Yaesu, as well as many handhelds. This chip includes a Received Signal Strength Indicator (RSSI) pin that has a linear output voltage that corresponds to signal strength. This is a very convenient signal to have access to for transmitter hunting. The output is good over about a 70 dB range.

The block diagram for the IC is shown below from the Toshiba datasheet. Pin 12 is the RSSI output.

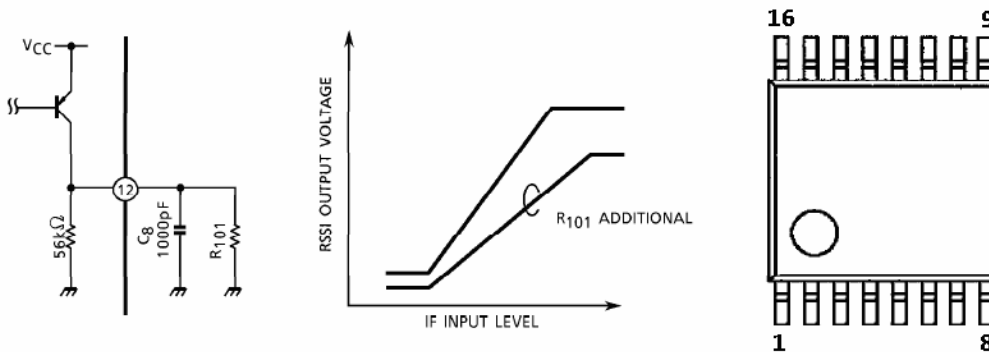
BLOCK DIAGRAM



The description of the RSSI pin, again from the Toshiba datasheet is shown below, along with the physical pin out of the device.

RSSI function

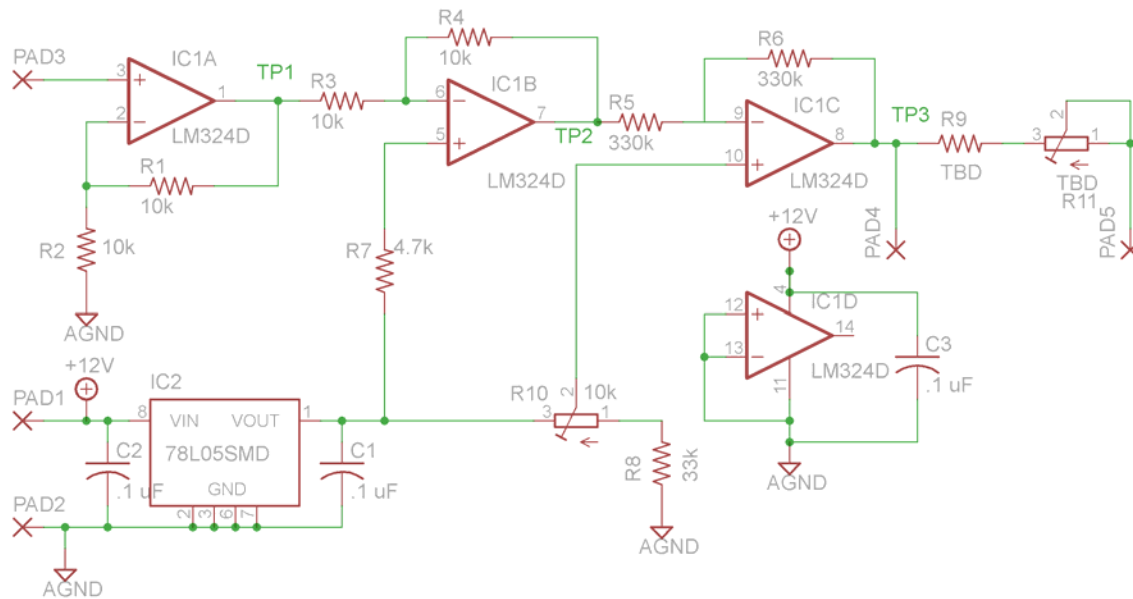
A DC voltage corresponding to the input level of IF input pins (pin 5) is output to the RSSI pin (P12). While the linear range is about 80dB when $V_{CC} = 2V$, the range can be expanded to 80dB. However, in such a case, note that the temperature characteristics of the RSSI output may alter due to a disparity between the temperature coefficient of the external resistor and the internal resistance of the IC.



Unfortunately, as shown in the graph, the output does not start at 0V. The output ranges from about 0.8V to about 2.2V over the entire useful range. For some applications, like driving an external panel meter for example, it would be more convenient to have this range shifted to start at zero. For an external panel meter, this would mean that there would be no meter deflection without any signal present. This is a situation that is more intuitively appealing.

That is what this project is all about. This circuit takes the output of pin 12 of the TA31136 IC and converts it to a range of 0.0V with no signal and about 2.8V with full signal strength. The simple circuit is shown below. The pad connections are as follows:

Pad #	Description
1	+12V Power
2	Ground
3	RSSI input from TA31136 IC
4	Voltage Output
5	Panel Meter Output



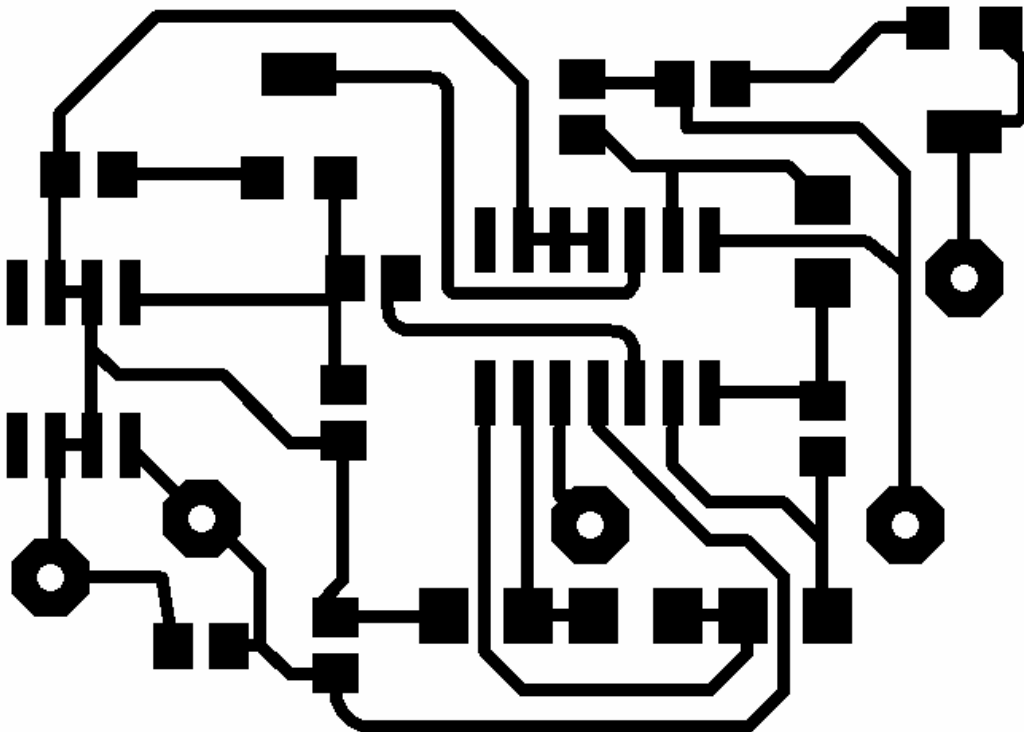
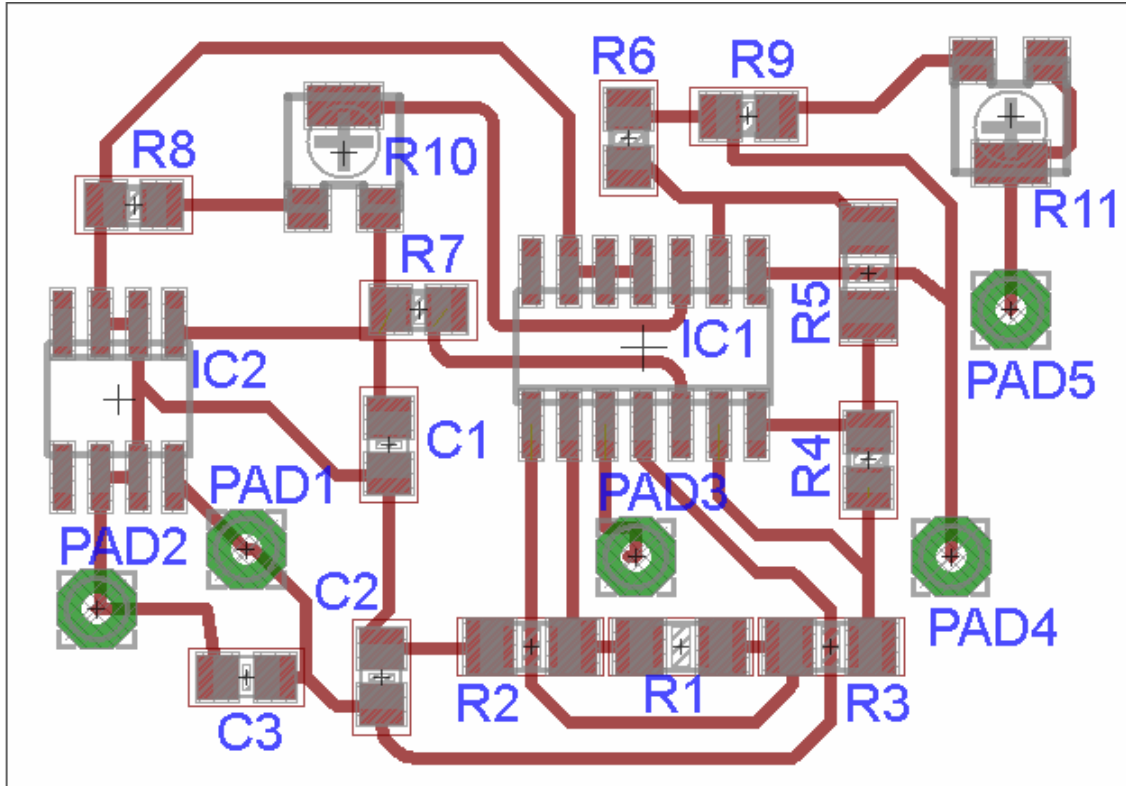
To calibrate, take the antenna off the radio to assure a no signal condition. The input voltage at Pin 3 of the LM324 should be approximately 0.8V. Adjust R10 until the output at pin 8 of the LM324 just zeroes, or stops dropping slightly above 0V. Confirm that the slightest signal present causes the output at Pin 8 to rise. Full signal strength will cause an output near 2.8V on Pin 8.

For trouble shooting purposes, I have made a table of the approximate voltages that should be present at different conditions, as shown below.

V _{in}	TP1	TP2	TP3
0.8	1.6	8.4	0.0
2.2	4.4	5.6	2.8

If it is desired to drive a panel meter, the appropriate resistors for R9 and R11 can be added. The total series resistance of the resistor and pot should be selected so that the pot has some adjustment available when the full scale signal is present. For a 200 uA Full Scale panel meter, suitable values were 10k for R9 and R11. These values will vary with different full scale currents.

Shown below are the layouts for a PCB and the parts list should that be of interest.



Part	Value	Package
C1	0.1uF	C0805
C2	0.1uF	C0805
C3	0.1uF	C0805
IC1	LM324D	SO14
IC2	78L05SMD	SO08
R1	10k	R1206
R2	10k	R1206
R3	10k	R1206
R4	10k	R0805
R5	330k	R1206
R6	330k	R0805
R7	4.7k	R0805
R8	33k	R0805
R9	TBD	R0805
R10	10k	3mm pot
R11	TBD	3mm pot