



FEATURES

- 2.45 GHz signal strength measurement
- -60dBm to 0dBm dynamic range
- +/- 3dB calibration adjustment
- 40dB rejection of signals <2.0GHz and >4.5GHz
- peak capture algorithm for low duty cycle transmissions
- measures signals with pulse widths as low as 5usec
- SMA antenna input
- 2.45 GHz antenna
- easy to read 7 segment display
- optional LiPo battery
- internal USB charger
- 4.6" x 1.4" x 1.1" portable size not including antenna
- simple maintenance
- durable construction

DESCRIPTION

The E2440 2.45 GHz RSSI provides easy relative signal measurement of CW or pulsed 2.45 GHz signals such as WiFi, cordless telephones, or radio control transmitters over a 60dB range. A peak capture algorithm and moving average filter will accurately measure transmission pulse widths down to 5usec over a 12msec period. A LiPo charger circuit is included. Charging is via a USB connection with a micro USB cable.

APPLICATIONS

- 2.45 GHz Industrial, Scientific, Medical (ISM) band relative signal measurement
- WiFi, cordless telephone, radio control signal measurement

Table 1. Absolute Maximum Ratings

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{dd}	USB Charge Voltage	4.5		5.5	V
V_{bat}	Battery Voltage	3.7		4.2	V
RF Pin	RF Input Power (W)			0.5	W
RF Pin	RF Input Power (dBm)			27	dBm
T_{MAX}	Temperature	-10		35	°C

Table 2. Electrical Characteristics

Test Conditions: Supply Voltage $V_{dd} = +4.2V$, $T_{ambient} = 25^{\circ}C$, unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{DD}	Supply voltage	3.3		4.2	V
I_{DD}	Supply current	10	32		mA
RF Pin	RF Input Power Range	-60		0	dBm

General Precautions

Charged devices and circuit boards can discharge without warning. Proper ESD precautions should be followed to avoid failure.

This device is not authorized for use in any product where the failure or malfunction of the product can reasonably be expected to cause failure in a life support system or to significantly affect its operation.

Locus Engineering Inc. reserves the right to make changes at any time without notice to improve product features or reliability.

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Description

The E2440 2.45GHz Received Signal Strength Indicator (RSSI) is a small unit allowing quick and simple measurement of RF signals in the ISM band over a -60 to 0 dBm range. The RF front end includes a female SMA connector, a 2.45GHz bandpass filter, and a RF power detector allowing measurement over a 60dB dynamic range. A small microcontroller displays the RF power as a number between 60 and 0. There is a +/-3dB adjustment of the display for calibration purposes. The unit includes a lithium battery charger with a micro-USB connector.

Operation

On power up, the battery voltage is measured and displayed typically between 33 to 42 corresponding to 3.3V to 4.2V. If the battery voltage is below 3.3V the display will also indicate a single horizontal bar on the units digit, and then shutdown to minimize further battery current drain. Note that the battery shutdown current drain is only reduced to ~10mA from the normal operating current of ~32mA, so the battery should be recharged.

A SMA antenna is included for measurement of radiated RF energy. Conducted RF energy can be measured using a SMA cable.

RF Front End Details

The RF front end includes a female SMA connector, a TDK DEA252450BT-2027A1 2.45GHz bandpass, and a Linear Technologies LT5534 RF power detector.

The bandpass filter has a typical insertion loss of 1dB within the 2.4-2.5GHz passband, and 35dB rejection of frequencies outside the passband.

The power detector has a 60dB measurement range and provides a mostly linear voltage output corresponding to the logarithm of the input power. The -55dBm to -5dBm range is linear however the values outside this deviate slightly.

Please consult the datasheets for more details on the bandpass filter and the RF power detector.

RF Measurement Algorithm

The E2440 RSSI samples the voltage output from the power detector at 200KHz. The results are applied to a peak detector to capture low duty cycle RF emissions. The peak values are also applied to a moving average filter to stabilize the readings. The filtered values are then equated with the power detector's dBm to voltage response.

Battery Details

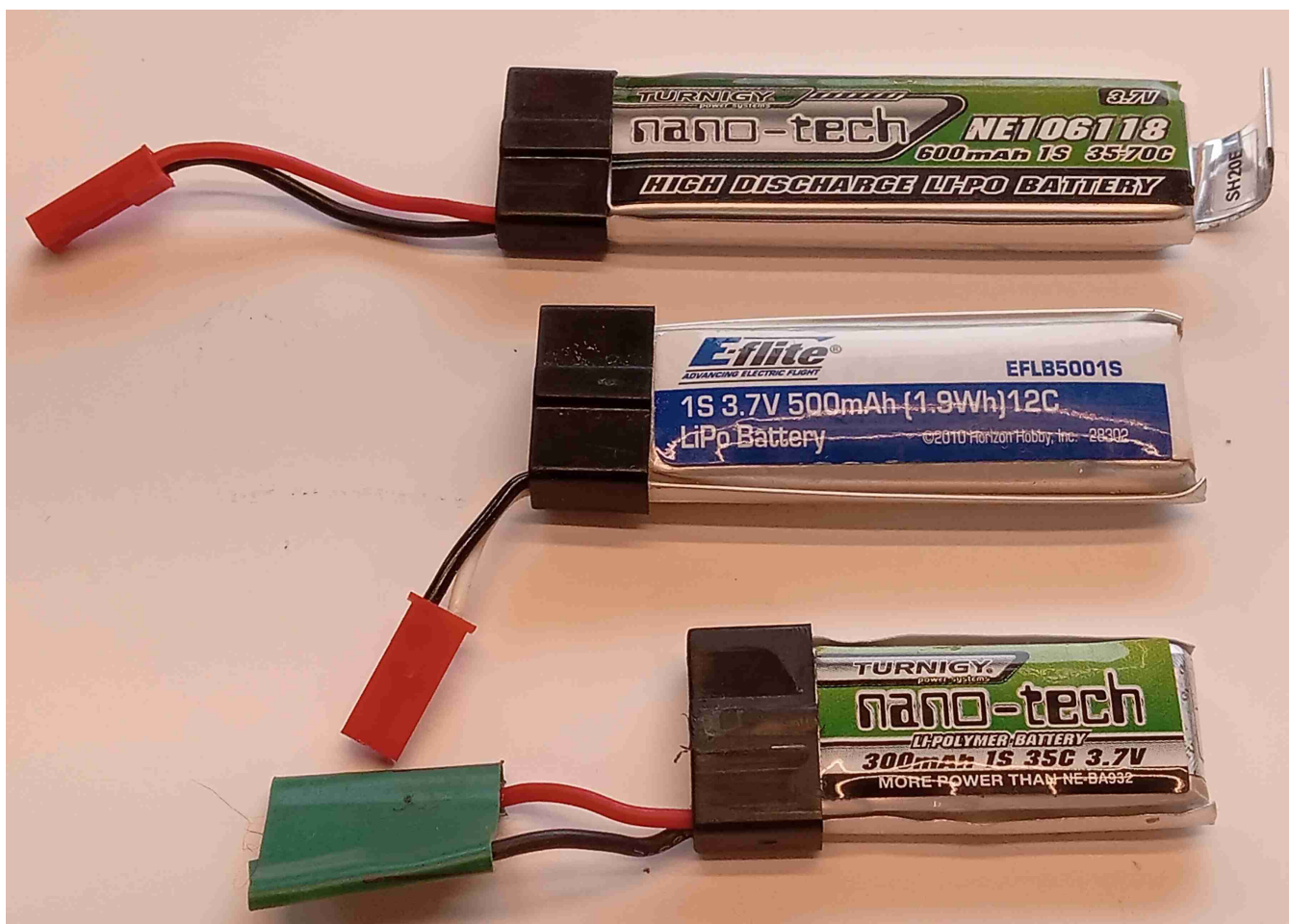
The unit requires a single cell LiPo battery or equivalent to operate. Typically any of the "chicklet" style rectangular 1S batteries with a current rating between 300mAh and 600mAh can be used. These batteries provide between 3.7-4.2V of useful voltage range.

The battery must be <0.30" (7.6mm) thick, <2.6" (66mm) length, and <1" (25mm) width to fit the enclosure. It also needs to have a JST two pin connector which are usually standard on these batteries. Take care not to use LiPo batteries that are inflated or damaged. Do not force fit any LiPo battery into the enclosure. These batteries will fit inside the enclosure.

Warning! LiPo batteries are fire hazards if overcharged or physically damaged. If batteries are inflated or damaged, discharge them into a lamp load and dispose of according to state regulations.

Always turn the unit off when not in use.

Depending on the battery capacity, the unit can run between 5-10 hours on a single charge. The unit consumes about 32mA when operating. When the battery voltage indicates 3.7V or less, it is time to recharge.

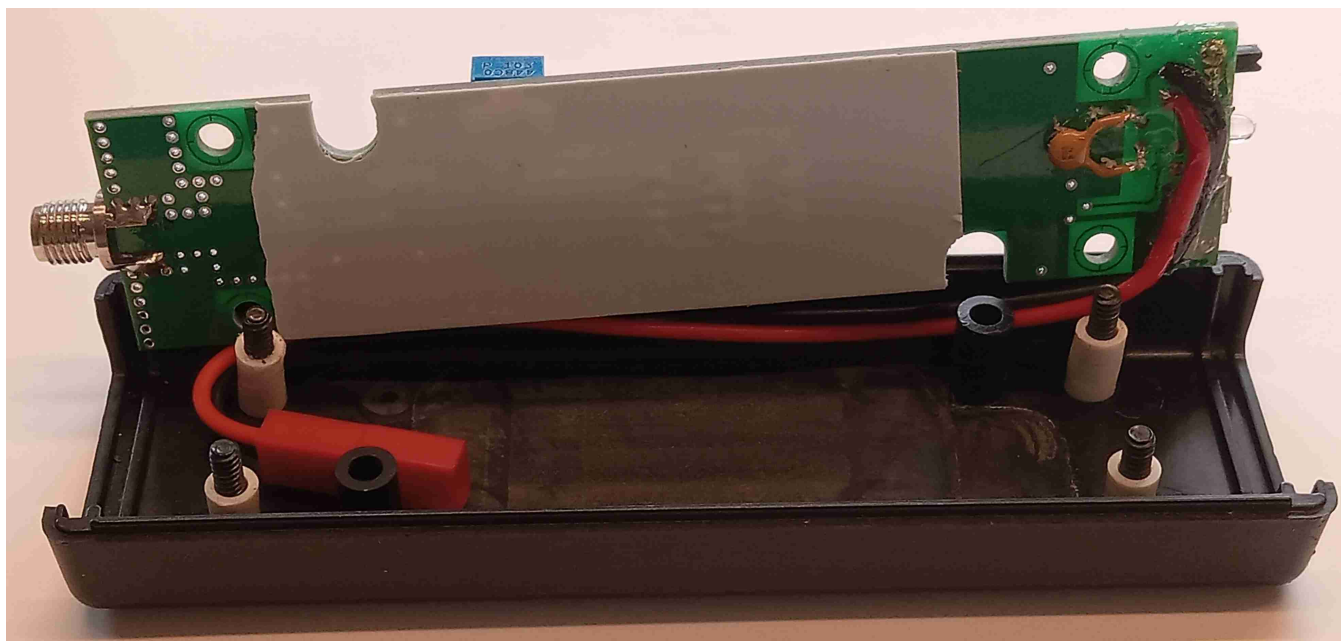


Battery Installation Details

Turn the power switch to "OFF". Open the unit from the back; there are two diagonally placed screws that need to be removed. Gently pry apart the enclosure halves. Lift out the two end plates and set aside.

The battery cable can be routed as shown below so it does not get pinched when the unit is reassembled.

First confirm the battery will fit easily between the posts, and does not exceed a thickness of 0.3" or 7.6mm. It may be necessary to reorient the battery and the cable so the connection is not strained, and so everything remains below the height of the standoffs supporting the board. Do not run the battery cable over or under the battery, only around it or along the sides.



Once the battery is secure, place the end plates at the board ends, and insert into the bottom enclosure. Check that nothing is pinched and the board sits flush on the standoffs. Place the top enclosure and check that it seats easily. Reattach the two screws holding the enclosure halves together.

Turn the unit on, verify the battery voltage is displayed followed by the RF power reading. Note that if the battery voltage is $<3.3V$ that the unit will display a single horizontal bar and shutdown. Turn the unit off.

If the battery voltage is 3.7V or less, it is time to recharge.

Battery Charger

The E2440 RSSI includes a lithium battery charger based on the Microchip MCP73831. The maximum charge rate is set to 500mA, and the maximum charge voltage is 4.2V. This battery charger has an automatic charge shutoff to prevent overcharging of the battery.

Warning! Ensure that the selected battery will accept a charge of 500mA. LiPo batteries are a fire hazard if charged at a higher than allowed charging current. Check the battery datasheet to be sure.

To charge the battery, connect a micro-USB to USB-A cable to any USB port or wall adapter capable of providing 500mA. The charge light will be on during charging, and will turn off when charging is complete. Charging time depends on the battery mAH capacity, but will be 1-2 hours.