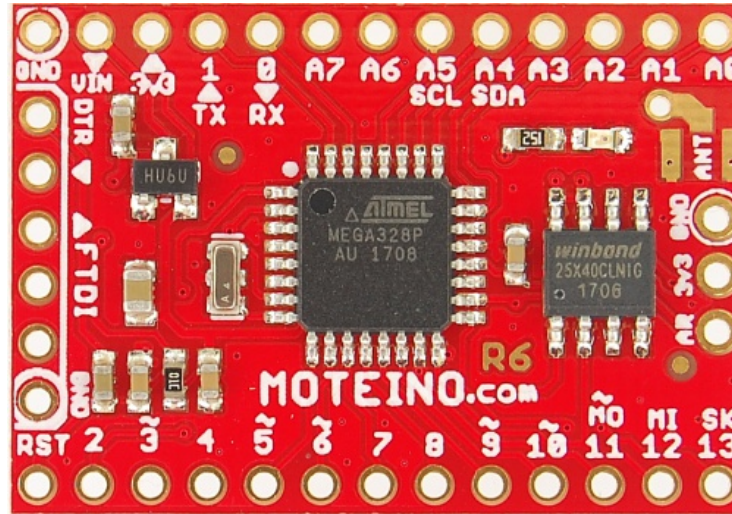


(<https://lowpowerlab.com/>)



## All about Moteino

A general introduction to the Moteino platform

**MOTEINO** ([HTTPS://LOWPOWERLAB.COM/GUIDE-CATEGORY/MOTEINO/](https://lowpowerlab.com/guide-category/moteino/))

[Introduction \(/guide/moteino/\)](/guide/moteino/)

[Why Moteino? \(/guide/moteino/why-moteino/\)](/guide/moteino/why-moteino/)

[Out of box \(/guide/moteino/out-of-box/\)](/guide/moteino/out-of-box/)

[Specifications \(/guide/moteino/specifications/\)](/guide/moteino/specifications/)

[Moteino 8Mhz variant \(/guide/moteino/moteino-8mhz/\)](/guide/moteino/moteino-8mhz/)

[Transceivers \(/guide/moteino/transceivers/\)](/guide/moteino/transceivers/)

[LoRa support \(/guide/moteino/lora-support/\)](/guide/moteino/lora-support/)

[Programming & libraries \(/guide/moteino/programming-libraries/\)](/guide/moteino/programming-libraries/)

[Wireless programming \(/guide/moteino/wireless-programming/\)](/guide/moteino/wireless-programming/)

### **Antenna options (/guide/moteino/antenna-options/)**

[FLASH-MEM option \(/guide/moteino/whats-the-flash-mem/\)](/guide/moteino/whats-the-flash-mem/)

[Revision history \(/guide/moteino/revision-history/\)](/guide/moteino/revision-history/)

[Design files \(/guide/moteino/design-files/\)](/guide/moteino/design-files/)

[Fritzing Parts \(/guide/moteino/fritzing-parts/\)](/guide/moteino/fritzing-parts/)

[MISC \(/guide/moteino/misc/\)](/guide/moteino/misc/)

[All-in-1 page \(/guide/moteino/?view=all\)](/guide/moteino/?view=all)

## Antenna options

Posted on **August 25, 2016** (<https://lowpowerlab.com/guide/moteino/antenna-options/>)



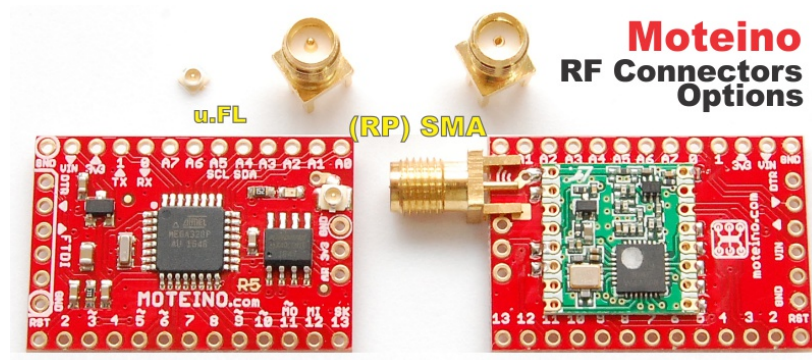
If you are new to RF and Antennas, consider reading this **RF Best Practices**

(<https://lowpowerlab.com/guide/rf-best-practices/>) guide for a basic understanding of wireless and radio technology

Moteinos are shipped with 1/4 wavelength monopole wire that should be soldered to the **ANT** pin. Each frequency has a specific antenna wire length. Without the antenna Moteinos will only have a few feet range at most. See this forum post (<http://lowpowerlab.com/forum/index.php/topic,181.0.html>) about some antenna theory. You can increase the RF performance with dipoles (1/2 wavelength). See this forum thread (<https://lowpowerlab.com/forum/rf-range-antennas-rfm69-library/easy-pcb-dipoles-for-433-868-and-915mhz/>) for some open source dipole antennas. The default basic monopole wire has an excellent performance to cost ratio.

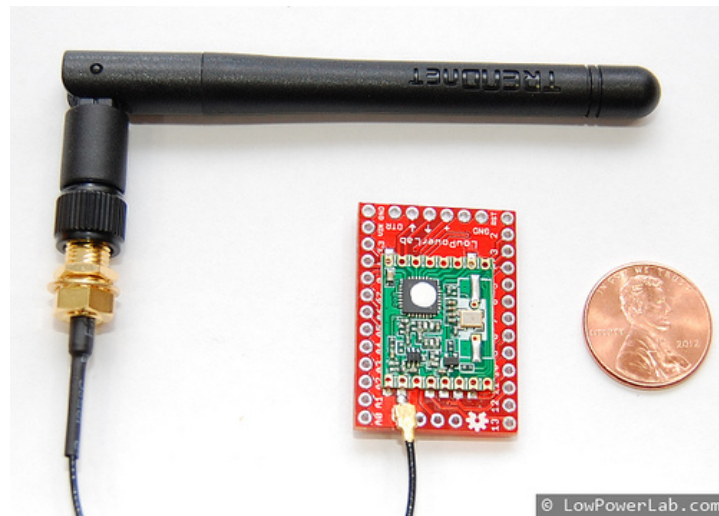
You can also solder **SMA** or **U.FL** connectors and hook up other types of antennas:

<https://lowpowerlab.com/guide/moteino/antenna-options/>



(<https://lowpowerlab.com/wp-content/uploads/2017/04/MoteinoRFConnectors.jpg>)

On older Moteinos you can carefully solder u.FL or SMA connectors between the **ANT** pin and GND:



(<http://www.flickr.com/photos/15304611@N03/sets/72157636923824146/>)

Range is a difficult to estimate because RF performance is affected by very many factors. Any obstacles between nodes can absorb or deflect the signal. Atmospheric conditions can also have an impact (humidity, rain, snow etc). Some basic tests with RFM12B and RFM69W in open air with the basic sample sketches (<https://github.com/LowPowerLab/RFM69/blob/master/Examples/Node/Node.ino>) reveal these range results:

- RFM69W: 350m+ at 55.5kbps (<http://www.youtube.com/watch?v=mRGY1KvX4bY>)
- RFM12B: ~150m at 39.2kbps

RFM69HW is a higher power version of RFM69 (20dBm vs 13dBm) and it can reach significantly further. Other users have done some experiments and have reported various ranges:

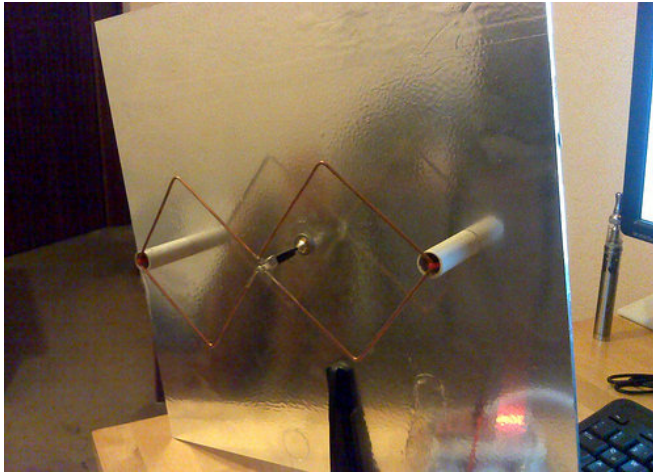
- RFM69W @ 55.5kbps with 1/2 monopole: 400m+
- RFM69HW @ 1.2kbps with dipole (<http://lowpowerlab.com/forum/index.php/topic,112.msg288.html>): 1.5miles !
- RFM69HW @ 38.4kbps (<http://lowpowerlab.com/forum/index.php/topic,114.0.html>): 560m+:
- Some forum users have achieved many km of range (<http://lowpowerlab.com/forum/rf-range-antennas-rfm69-library/>) by tweaking the stock RF settings!



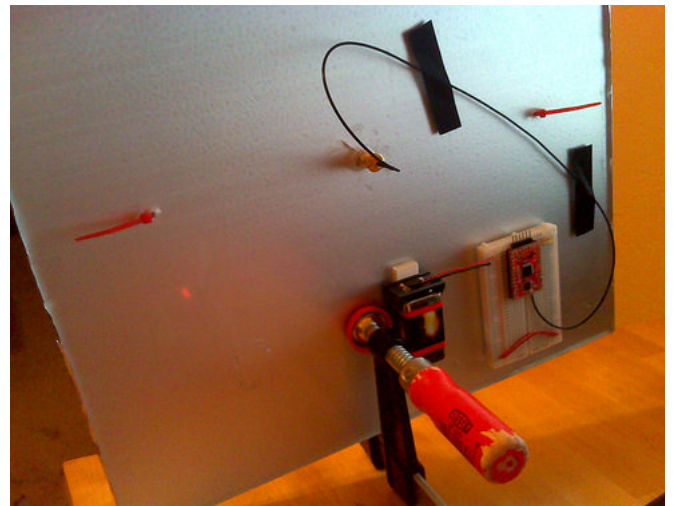


(<http://lowpowerlab.com/forum/index.php/topic,114.0.html>)

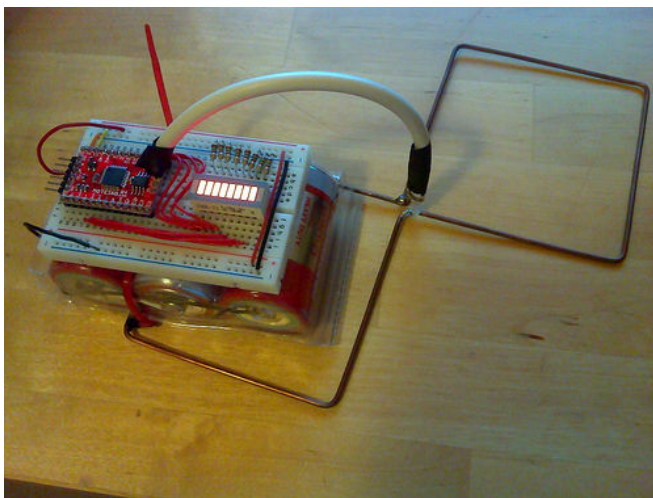
Here is an example range test of 2.5Km with stock Moteinos and some interesting BiQuad antennas, build details in the forum (<https://lowpowerlab.com/forum/moteino/range-test-with-two-biquad-antennas-2-5km-range/>):



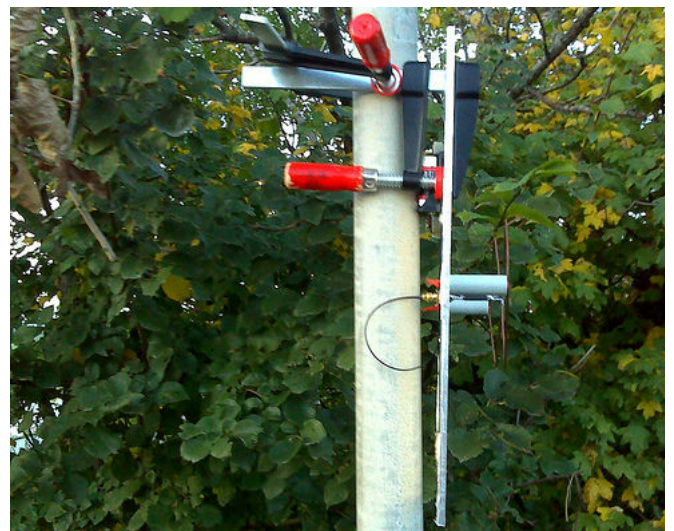
([https://farm4.staticflickr.com/3937/15545444882\\_1ba9e9b87c.jpg](https://farm4.staticflickr.com/3937/15545444882_1ba9e9b87c.jpg))



([https://farm6.staticflickr.com/5607/15520900026\\_4e5f2320d7.jpg](https://farm6.staticflickr.com/5607/15520900026_4e5f2320d7.jpg))



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◀ Wireless programming (<https://lowpowerlab.com/guide/moteino/wireless-programming/>)

FLASH-MEM option ▶ (<https://lowpowerlab.com/guide/moteino/whats-the-flash-mem/>)

## Related Products

	Moteino ( <a href="http://lowpowerlab.com/shop/product/99">http://lowpowerlab.com/shop/product/99</a> )	<b>Buy: \$12.95</b>
	Moteino (8Mhz) ( <a href="http://lowpowerlab.com/shop/product/159">http://lowpowerlab.com/shop/product/159</a> )	<b>Buy: \$10.95</b>
	Moteino-USB ( <a href="http://lowpowerlab.com/shop/product/100">http://lowpowerlab.com/shop/product/100</a> )	<b>Buy: \$19.95</b>
	Moteino MEGA ( <a href="http://lowpowerlab.com/shop/product/119">http://lowpowerlab.com/shop/product/119</a> )	<b>Buy: \$19.95</b>

	MoteinoMEGA-USB ( <a href="http://lowpowerlab.com/shop/product/138">http://lowpowerlab.com/shop/product/138</a> )	<b>Buy: \$22.95</b>
	Moteino (trace antenna) ( <a href="http://lowpowerlab.com/shop/product/145">http://lowpowerlab.com/shop/product/145</a> )	<b>Buy: \$12.95</b>
	Moteino MEGA (trace antenna) ( <a href="http://lowpowerlab.com/shop/product/139">http://lowpowerlab.com/shop/product/139</a> )	<del><b>Buy: \$19.95</b></del> <b>Special: \$15.95</b>
	FTDI Adapter ( <a href="http://lowpowerlab.com/shop/product/90">http://lowpowerlab.com/shop/product/90</a> )	<b>Buy: \$14.95</b>
	RFM69HW transceiver ( <a href="http://lowpowerlab.com/shop/product/96">http://lowpowerlab.com/shop/product/96</a> )	<del><b>Buy: \$6.50</b></del> <b>Special: \$4.50</b>
	RFM69W transceiver ( <a href="http://lowpowerlab.com/shop/product/87">http://lowpowerlab.com/shop/product/87</a> )	<del><b>Buy: \$5.95</b></del> <b>Special: \$3.95</b>
	RFM95 LoRa transceiver ( <a href="http://lowpowerlab.com/shop/product/143">http://lowpowerlab.com/shop/product/143</a> )	<b>Buy: \$11.95</b>
	RFM96 LoRa transceiver ( <a href="http://lowpowerlab.com/shop/product/144">http://lowpowerlab.com/shop/product/144</a> )	<b>Buy: \$11.95</b>
	MightyHat ( <a href="http://lowpowerlab.com/shop/product/130">http://lowpowerlab.com/shop/product/130</a> )	<b>Buy: \$41.95</b>
	SwitchMote ( <a href="http://lowpowerlab.com/shop/product/128">http://lowpowerlab.com/shop/product/128</a> )	<b>Buy: \$35.95</b>
	MotionMote Kit ( <a href="http://lowpowerlab.com/shop/product/114">http://lowpowerlab.com/shop/product/114</a> )	<b>Buy: \$24.95</b>
	SonarMote Kit ( <a href="http://lowpowerlab.com/shop/product/129">http://lowpowerlab.com/shop/product/129</a> )	<b>Buy: \$29.95</b>
	SwitchMote PSU ( <a href="http://lowpowerlab.com/shop/product/127">http://lowpowerlab.com/shop/product/127</a> )	<b>Buy: \$30.95</b>