

MIRA™

Mira is a platform for creating self-healing multi-hop networked systems utilizing the world wide license-free 2.4GHz ISM band. Mira builds upon LumenRadio's patented technologies for Cognitive Coexistence, enabling deployment even in highly congested wireless environments.

Cognitive Coexistence enable Mira networks to operate alongside other wireless networks in the same frequency range. Wireless environments change all the time; walls are built, trucks or buses can block the line-of-sight outdoors, etc. Mira networks are self-organizing and self-healing, meaning that the network data finds its way through the network over multiple radio hops if necessary - and the traffic will automatically get re-routed if a communication path gets blocked. Mira networks even utilize multi-path redundancy, allowing traffic to propagate towards its target using several different routes at the same time.

Mira networks can scale up to several thousands of nodes. Mira networks are easy to set up thanks to LumenRadio's commissioning feature that allows for both network setup as well as user application setup.

MIRAOS™

MiraOS is the foundation of the Mira platform and includes the entire communication stack. While it incorporates advanced technologies like Cognitive Coexistence, 6LoWPAN, etc., it's still extremely easy to use when developing your applications. MiraOS exposes a developer-friendly API and deals with all the advanced logic in the background.

MiraOS is multi-tasking allowing applications to use multiple threads to simplify application development. MiraOS also comes with a full hardware abstraction layer (HAL) that lets the developer write generic easy to read software without the hassle of writing code for handling the hardware.

MIRAONE™

The MiraOne radio module is easy to integrate into your next product. MiraOne features a powerful 32bit ARM Cortex-M3 microcontroller that can host your MiraOS based application for lowered BOM costs, or interface an external processor via a serial interface.

Solderable as a SMT assembly, MiraOne is aimed to meet the cost requirements for high volume production, but still allow for low volume production and easy prototyping.

- ARM Cortex-M3 microcontroller
- 512kB program Flash
- 512kB data storage Flash
- IEEE802.15.4 radio
- IPEX (u.FL) antenna connector for external antenna
- Integrated chip antenna
- Ultra-low energy mode allowing for over 10 years battery life
- 123dB link-budget allowing for up to 1000m range (line-of-sight) per hop
- Typical one-hop latency: below 20ms
- 128bit AES encryption



CORE FEATURES

MiraOS

- Easy to develop applications
- Multi-tasking
- Full communications stack
- Hardware abstraction layer

MiraOne

- Cost effective
- Short time to market
- Secure 128bit AES encryption

Best-in-class

- Multiple firmware upgrade options, including for battery powered nodes
- Cognitive coexistence for reliable networks
- Scalable - thousands of nodes over large areas
- Better World Kit - rapid prototyping of your proof-of-concept

TECHNICAL SPECIFICATIONS

For more information and examples, visit lumenrad.io/mira.

OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Unit
Operating supply voltage	VCC	2.3	3.6	V
Operating ambient temp.	TA	-40	80	°C

RF CHARACTERISTICS

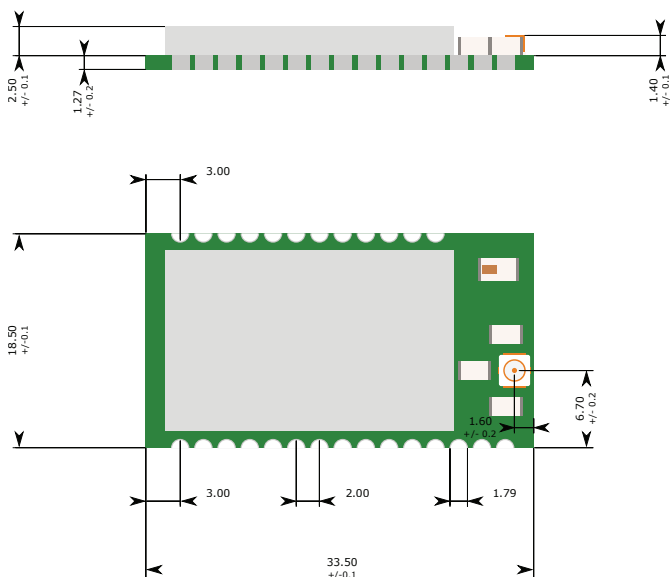
Measured at 3.3V, 25°C. Limits apply over entire frequency range 2405-2480 MHz (channel 11-26).

Parameter	Symbol	Min	Typ	Max	Unit
RF frequency range		2405		2480	MHz
Receiver sensitivity, PER = 1%	RX_{SENS}		-101		dBm
Receiver sensitivity battery mode, PER = 1%	RX_{SENS_BATT}		-92		dBm
Receiver saturation, PER = 1%	RX_{SAT}			-5	dBm
Receiver saturation, PER = 1%	P_{OUT_MAX}	16.5	17	17.5	dBm
Output return loss at U.FL connector	S22		-10	-5	dB

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Peak current consumption, continuous transmission @ 17dBm, no peripherals active	$I_{TX_PEAK_17DBM}$		120	150	mA
Peak current consumption, continuous transmission @ -2.7dBm, no peripherals active	$I_{TX_PEAK_NEG2_7DBM}$		60	80	mA
Peak current consumption, battery mode @ 2.5dBm, no peripherals active	$I_{TX_PEAK_2_5DBM}$		60	80	mA
Peak current consumption in RX mode, -50dBm input, no peripherals active	I_{RX}		40	60	mA
Peak current consumption in RX battery mode, -50dBm input, no peripherals active	I_{RX_BATT}		35	55	mA
Average current consumption, high power mode, 17dBm TX, no peripherals active	I_{TX_AVG}		45	50	mA
Average current consumption ¹ , battery mode, 2.5dBm TX, no peripherals active	$I_{TX_AVG_BATT}$		35	40	mA

MECHANICAL DIMENSIONS



THE BETTER WORLD KIT

The Better World Kit is a development kit for the Mira platform. It contains everything you need to start prototyping your ideas, from Mira development boards to sensors and actuators.

To order your very own Better World Kit, visit lumenrad.io/mira.

