



# SMARTMESH IA-510™

## M2510

Industrial

**PRODUCT DESCRIPTION** > The M2510 mote module combines Dust Networks' robust sensor networking solution with industry-leading low-power radio technology in an easy-to-integrate 22-pin module. As part of the SmartMesh IA-510 system, the M2510 enables customers to integrate a standards-based wireless network into sensors and actuators to provide scalable bidirectional communications.

The M2510 is designed for use in line-powered, battery-powered, or energy-scavenging sensor and actuator applications that demand reliable performance and ultra-low power operation. With Dust Networks' innovative IEEE 802.15.4-compliant design and integrated power amplifier, the M2510 enables a decade of battery life on two AA batteries. All motes function as wireless routers, enabling a redundant, high performance, full-mesh topology.

The M2510 integrates all radio circuitry components, including an MMCX-type antenna connector to eliminate the need for complex RF design. To accelerate customer development time and reduce development costs, Dust Networks provides a fully engineered RF solution, comprehensive APIs, and complete development documentation.

**ABOUT SMARTMESH IA-510** > Dust Networks' SmartMesh IA-510 is an industry-leading wireless networking solution designed for critical monitoring and control applications. IA-510 serves a wide range of applications from renewable energy generation, such as solar and wind power, to factory machine health monitoring and data center HVAC energy management. The SmartMesh IA-510 system delivers dynamic network optimization and intelligent routing to achieve unsurpassed levels of wireless network scalability, system-wide reliability and low latency, coupled with industrial-class security. Additionally, ultra-low power operation permits even greater deployment flexibility for wire-free applications.

### KEY FEATURES

#### HIGHLY SCALABLE

- ⊗ Automatic network formation—new motes join automatically from anywhere in the network
- ⊗ All motes are wireless routers, providing a full-mesh network that easily scales to tens of thousands of motes per square kilometer
- ⊗ Time-synchronized communication across 15 channels virtually eliminates in-network collisions, allowing for dense deployments in overlapping radio space

#### SUPERIOR RELIABILITY

- ⊗ SmartMesh IA-510 Intelligent Networking Platform enables greater than 99.99% network reliability even in the most challenging monitoring and control environments
- ⊗ Time-synchronized channel hopping minimizes the impact of crippling multipath interference in dynamic RF environments

#### ULTRA-LOW POWER OPERATION

- ⊗ Industry-leading radio technology capable of line-powered, battery-powered, or energy-scavenging operation
- ⊗ Automatic network-wide coordination optimizes power consumption, enabling a decade of network operation on two Lithium AA batteries

#### EASY TO INTEGRATE AND DEPLOY

- ⊗ Fully engineered RF, with power amplifier (PA), balun, crystals, antenna matching circuitry and antenna connector
- ⊗ Comprehensive APIs provide rich and flexible functionality to ease software development and device integration

#### GLOBAL MARKET SOLUTION

- ⊗ Modular 2.4GHz band RF certifications for FCC, IC and CE dramatically reduce cost and complexity of global wireless device certification

## NORMAL OPERATING CONDITIONS

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operational supply voltage range	2.75	3.0	3.3	V	
Operating temperature range	-40		85	°C	
Operating relative humidity	10		90	%RH	Non-condensing

## CURRENT CONSUMPTION

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Transmit					
PA enabled		18		mA	
PA disabled		7		mA	
Receive		6		mA	

## DETAILED RADIO SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating frequency	2.4000		2.4835	GHz	
Number of channels		15			
Channel separation		5		MHz	
Occupied channel bandwidth		2.7		MHz	At -20 dBc
Modulation					IEEE 802.15.4 direct sequence spread spectrum (DSSS)
Raw data rate		250		kbps	
Receiver sensitivity		-90		dBm	At 1% PER, Vcc = 3 V, 25° C
Output power, EIRP					Vcc = 3 V, 25° C, assumes +2 dBi antenna
PA enabled		10		dBm	
PA disabled		0		dBm	
Range*					
PA enabled:					
Indoor		100		m	
Outdoor		400		m	
PA disabled:					
Indoor		25		m	
Outdoor		200		m	

\* Actual performance varies depending on the specific installation environment.

## INNOVATIVE RADIO TECHNOLOGY

- IEEE 802.15.4-compliant radio
- Integrated power amplifier for 10 dBm operation
- Ultra-low RF receiver current
- Direct Sequence Spread Spectrum (DSSS)
- Time-synchronized channel hopping operation

## POWER MANAGEMENT

- Compatible with energy-scavenging technologies
- Charge consumption tracking for battery metering

## COMPREHENSIVE API

- Supports fast file transfer and request/response data traffic
- Flexible configuration parameters for full control of all mote operations
- Flow-controlled serial interface supports resource-constrained microprocessors

## FULL DEVELOPMENT SUPPORT

- OEM development kit:
  - Rich library of application notes
  - Reference designs
  - Sample code
  - Software debug utilities

## ROBUST SECURITY

- Industry-proven security meets standards for critical infrastructure
- 128-bit AES encryption ensures secure data transmission

