LM511 WiFi 802.11ac Dual Band 2T2R PCIe Minicard
2.4GHz & 5GHz ISM Band Mini PCI Express Card with RF IPEX Receptical

Features
- WiFi 802.11 ac (2x2 MIMO technology improves effective throughput and range over existing 802.11 a/b/g/n/ac products).
- PCI express & 2 x IPEX recepticals.
- Linux, Windows XP, Vista, 7, 8.1, 10 compatible.
- Up to 866.7 Mbps High Speed Data Transfer Rate.
- 802.11e-compatible bursting and I standards.
- BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM, DBPSK, DQPSK and CCK modulation schemes.
- WEP, TKIP, and AES hardware encryption Schemes.
- WiFi Direct supports wireless peer to peer applications.
- Complete 802.11n MIMO solution for 2.4GHz and 5Ghz band.
- Support 2.4Ghz and 5Ghz band channels.
- 2.4 GHz backward compatible with 802.11a/b/g devices while operating at 802.11n data rates.
- 5 GHz backward compatible with 802.11a/n devices while operating at 802.11ac data rates.
- Complies with PCI Express Base Specification Revision 1.1.
- 2T2R Two Transmit and Two Receive paths.
- RoHS, REACH and WEEE compliant.
- See our website for more information and certifications.

Overview
The LM511 WiFi PCIe Minicard, fully supports IEEE 802.11 e and i standards.

It supports up to 866.7Mbps high-speed wireless network connections and is designed to provide excellent performance with low power consumption.

It is designed to be a highly cost-effective module that offers superior performance, better power management applications above its competitors.

Shield Option
This card is also offered with or without a shielding cover. Please speak with our team for guidance when looking at this option.
Features (Continued)

MAC Features

- Frame aggregation for increased MAC efficiency (A-MSDU, A-MPDU)
- Low latency immediate High-Throughput Block Acknowledgement (HT-BA)
- Long NAV for media reservation with CF-End for NAV release
- PHY-level spoofing to enhance legacy compatibility
- MIMO power saving mechanism
- Channel management and co-existence
- Multiple BSSID feature allows the LM511 to assume multiple MAC identities when used as a wireless bridge
- Transmit Opportunity (TXOP) Short Inter-Frame Space (SIFS) bursting for higher multimedia bandwidth

PHY Features

- 2x2 MIMO technology for extended reception robustness and exceptional throughput. IEEE 802.11ac MIMO OFDM.
- IEEE 802.11n MIMO OFDM.
- 5MHz / 10MHz / 20MHz / 40MHz / 80MHz bandwidth transmission.
- Short Guard Interval (400ns).
- Sounding packet.
- Support STBC.
- Support LDPC.
- Selectable digital transmit and receiver FIR filters.
- Programmable scaling in transmitter and receiver to trade quantization noise against increased probability of clipping.
- Fast receiver Automatic Gain Control (AGC).
- On-chip ADC and DAC.
- Build-in both 2.4GHz and 5GHz PA.
- Build-in both 2.4GHz and 5GHz LNA.

Other Features

- Supports Wake-On-WLAN via Magic Packet and Wake-up frame
- Transmit Beamforming
- CCA on secondary through RTS/CTS handshake.
- Support TCP/UDP/IP checksum offload

Peripheral Interfaces

- Configurable Bluetooth Coexistence Interface (mux with GPIO pins)
- Single external power source 3.3v only.

Standards Supported

- IEEE 802.11a/b/g/n/ac Draft 2.0 compatible WLAN.
- IEEE 802.11e QoS Enhancement (WMM).
- IEEE 802.11i (WPA, WPA2). Open, shared key, and pair-wise key authentication services.
- IEEE 802.11h TPC, Spectrum Measurement.
- IEEE 802.11k Radio Resource Measurement.
- WAPI (Wireless Authentication Privacy Infrastructure) certified.
- Cisco Compatible Extensions (CCX) for WLAN devices.
### General Specification

**Wireless**
- **Wireless Standard**: 802.11 a/b/g/n/ac
- **Card Type**: 11ac 2T2R Minicard (PCI express)
- **OS Compatibility**: Linux, Windows XP, Vista, 7, 8.1, 10 compatible
- **Security**: WPA, WPA-PSK, WPA2, WPA2-PSK, WEP 64bit & 128bit, IEEE 802.11x, IEEE 802.11i
- **Network Architecture**: Ad hoc mode (Peer-to-Peer), Infrastructure mode, Soft AP

**Data Rate**
- **802.11b**: 11, 5.5, 2, 1 Mbps
- **802.11g**: 54, 48, 36, 24, 18, 12, 9, 6 Mbps
- **802.11n**: MCS 0 to 15 for HT20MHz; MCS 0 to 15 for HT40MHz
- **802.11ac**: MCS 0 to 8 for HT20MHz; MCS 0 to 9 for HT40MHz; MCS 0 to 9 for HT80MHz

**Media Access Control**
- CSMA/CA with ACK

**Hardware**
- **Chipset**: Realtek
- **Antenna**: 2 x IPEX recepticals
- **Interfaces**: PCI express (PCIe)

**RF Characteristics**
- **Tx Output Power**
  - 17dBm – 802.11b@CCK 11Mbps
  - 13dBm – 802.11n@MC57_HT20
  - 13dBm – 802.11a@OFDM 54Mbps
  - 10dBm – 802.11ac@NSS1_MCS9_BW20, BW40, BW80

  **15dBm – 802.11g@OFDM 54Mbps**
  - 13dBm – 802.11n@MC57_HT40
  - 12dBm – 802.11ac@NSS1 MCS7_BW20, BW40, BW80

- **Rx Sensitivity**
  - -82dBm – 802.11b@11Mbps
  - -67dBm – 802.11n@MC57_BW20
  - -57dBm – 802.11ac@NSS1_MCS9_BW20
  - -51dBm – 802.11ac@NSS1_MCS9_BW80

  **-71dBm – 802.11g@54Mbps**
  - -64dBm – 802.11n@MC57_BW40
  - -54dBm – 802.11ac@NSS1_MCS9_BW40

- **Power Consumption**
  - Transmit: max. 533 mA (Maximum)
  - Receive: max 391 mA (Maximum)

- **Operating Voltage**
  - 3.3v ±9% I/O supply voltage

- **Frequency**
  - 2.400GHz ~ 2.4835 GHz
  - 5.1500GHz ~ 5.3500GHz
  - 5.4700GHz ~ 5.7250GHz
  - 5.7250GHz ~ 5.8500GHz

- **Modulation Scheme**
  - **802.11b**: CCK, DQPSK, DBPSK
  - **802.11a/g/n**: QAM, 16 QAM, QPSK, BPSK
  - **802.11ac**: 256QAM, 64 QAM, 16 QAM, QPSK, BPSK

- **Spread Spectrum**
  - IEEE 802.11b: CCK (Complimentary Code Keying)
  - IEEE 802.11g/n/a/ac: OFDM (Orthogonal Frequency Division Multiplexing)
General Specification (Continued)

Physical Characteristics
- Operating Temperature: -20°C to +70°C ambient temperature, Humidity: 5-90% (non-condensing)
- Storage Temperature: -55°C to +125°C ambient temperature, Humidity: 5-95% (non-condensing)
- Dimensions (L x W x H): 29.85mm x 26.65mm x 4.45mm
- Weight: 7g +/- 0.25g tolerance
- Certifications: See our website for this product's certifications.
- Compliance: RoHS, REACH and WEEE

Block Diagram

Frequency Bands

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<tr>
<th>Freq</th>
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<th>Bands</th>
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<td>2.484 GHz</td>
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<td>5 GHz</td>
<td>UNII1 5.18-5.825 GHz</td>
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Pin Assignments

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<th>Pin</th>
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Diagrams
IPEX Connector Dimensions
Datasheet Version Notes

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<td>Added version notes to datasheet.</td>
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<td>01 MAY 2019</td>
<td>Updated Draft status</td>
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<td>v1.3</td>
<td>04 DEC 2019</td>
<td>New Page 1, 2 and 3. Plus Packing page updates.</td>
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<td>v1.4</td>
<td>08 JUN 2020</td>
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LM511 Packaging Options

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<td>511-0511</td>
<td>PCIe M2 WiFi 802.11ac RTL8812ae 2T2R REALTEK TRAY</td>
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See our website to download any applicable Product Software, Manuals and Notes - http://www.lm-technologies.com/downloads