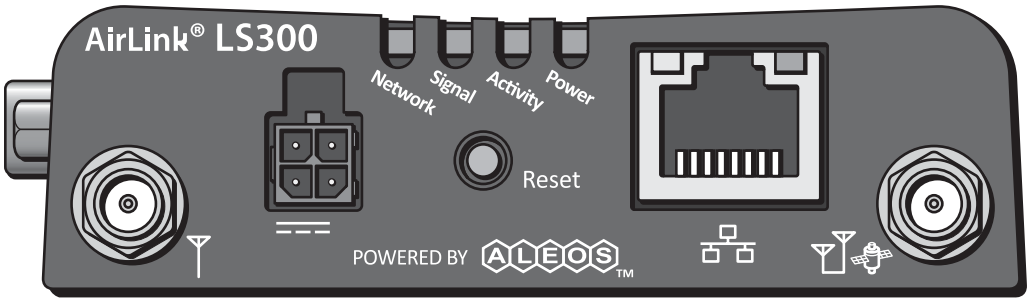
AirLink LS300

Product Specification Document



SIERRA WIRELESS™

4114089
Rev 5

Important Notice

Due to the nature of wireless communications, transmission and reception of data can never be guaranteed. Data may be delayed, corrupted (i.e., have errors) or be totally lost. Although significant delays or losses of data are rare when wireless devices such as the Sierra Wireless modem are used in a normal manner with a well-constructed network, the Sierra Wireless modem should not be used in situations where failure to transmit or receive data could result in damage of any kind to the user or any other party, including but not limited to personal injury, death, or loss of property. Sierra Wireless accepts no responsibility for damages of any kind resulting from delays or errors in data transmitted or received using the Sierra Wireless modem, or for failure of the Sierra Wireless modem to transmit or receive such data.

Safety and Hazards

Do not operate the Sierra Wireless modem in areas where blasting is in progress, where explosive atmospheres may be present, near medical equipment, near life support equipment, or any equipment which may be susceptible to any form of radio interference. In such areas, the Sierra Wireless modem **MUST BE POWERED OFF**. The Sierra Wireless modem can transmit signals that could interfere with this equipment.

The driver or operator of any vehicle should not operate the Sierra Wireless modem while in control of a vehicle. Doing so will detract from the driver or operator's control and operation of that vehicle. In some states and provinces, operating such communications devices while in control of a vehicle is an offence.

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AirLink Software Downloads	www.sierrawireless.com/Support/Downloads
Corporate Web Site	www.sierrawireless.com

* If you have purchased your product from an AirLink Distributor or Reseller, please contact them for first line technical support.

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	Hours:	8:00 AM to 5:00 PM Pacific Time
Post:	Sierra Wireless 13811 Wireless Way Richmond, BC Canada V6V 3A4	

Consult our website for up-to-date product descriptions, documentation, application notes, firmware upgrades, troubleshooting tips, and press releases:

www.sierrawireless.com

Revision History

Revision	Date	Summary of changes
1.3	**March 2013**	Conversion to FrameMaker template, updated specifications.
2	**April 2013**	Updated preface with Netgear information
3	**June 2013**	Updated Network Compliance and UMTS bands supported (Chapter 2)
4	**July 2013**	Updated sales contact information and added footer.
5	**Sept. 2013**	Updated some of the specifications.

Contents

List of Tables

1: Introduction

The AirLink LS300 is a compact, intelligent and fully-featured communications platform that provides real-time wireless capabilities for fixed and mobile applications such as:

- Remote asset monitoring
- Smart meters
- AVL applications
- Public safety vehicle deployments
- Point of sale terminals
- Digital signs

The AirLink LS300 has multiple communication ports including serial, Ethernet, and USB ports. The power connector has one digital I/O pin for remote monitoring and control and one ignition sense pin to turn the device on and off and trigger the low power mode.

The AirLink LS300 is a 3G cellular device that supports a variety of radio bands options, both on HSPA+ or CDMA EV-DO cellular technology.

The AirLink LS300, when coupled with the rich embedded intelligence provided by the embedded ALEOS software, is the perfect choice for a broad set of machine to machine solutions.

Purpose

The purpose of this document is to:

- Describe the features and specifications of the AirLink LS300
- Provide our partners and customers with the information required to integrate the device into their applications

Note: For information on how to install and use the LS300, see the AirLink LS300 User Guide. For information on how to configure the device, see the ALEOS Configuration User Guide. Both are available on the Sierra Wireless web site.

2: Specifications at a Glance

This section gives a brief summary of the critical high-level features of the LS300 Sierra Wireless gateway.

Regulatory, Radio Frequency and Electrical Specifications

Table 2-1: Specifications

Approvals & Compliance	FCC Industry Canada CE PTCRB R&TTE RoHS Compliant, Class 1, Div 2 Consult website for complete list of operator approval

Network Technology	**3G HSPA+ Models**
	Fallback to GSM / GPRS / EDGE
	• 800 / 850 / 1900 / 2100 MHz
	Sierra Wireless SL8090 radio module
	• 900 / 2100 MHz
	Sierra Wireless SL8092 radio module
	• Peak data rates
	  • Download (HSDPA Category 10) — 14.4 Mbps (peak rate)
	  • Upload (HSUPA Category 6) — 5.76 Mbps

	3G EV-DO Models
	Fallback CDMA 1xRTT
	• Rev. A 800 / 1900 MHz
	Sierra Wireless SL5011 radio module
	• Peak CDMA data rates
	  • Download — 3.1 Mbps (peak rate)
	  • Upload — 1.8 Mbps

Voltage Range	7–28VDC
Operating Temperature	-30°C to +70°C (-22°F to 158°F) full 3GPP RF compliance -40°C to +85°C (-40°F to 185°F) reduced RF performance
Reverse Polarity Protection	Compliant

Table 2-2: Connectors, LEDs and Reset

Power	4-Pin connector: Power, Ground, Configurable digital I/O and analog voltage input sensing, Configurable ignition sense (Low Power Mode Enable Input)
USB	USB v2.0 Micro-B connector
Ethernet	10/100 Base-T RJ45 Ethernet
Serial	RS-232 serial port
Network Antenna	2 SMA female (Main + GPS/Diversity)
Reset	Manual reset button
SIM Card holder (HSPA only)	Accessible via top plate removal
LEDs	4 green/red/yellow LEDs: Network, Signal, Activity, Power

Support Features

The LS300 offers a 3-year warranty.

Supporting Documents

See Sierra Wireless Documents on page 33.

Accessories Available

- DIN rail mounting bracket
- Screw-in mounting bracket
- Antennas: PCS, GPS and cellular for CDMA and GSM
- AC 12VDC power adapter
- DC power cord
- Cigarette lighter adapter
- Ethernet cable
- DB-9 serial cable (6 ft and 25 ft lengths)
- USB cable

3: Electrical Specifications

The AirLink LS300 complies with the electrical specifications in this section.

Power Connector

Figure 3-1 shows the power connector's pin-out.

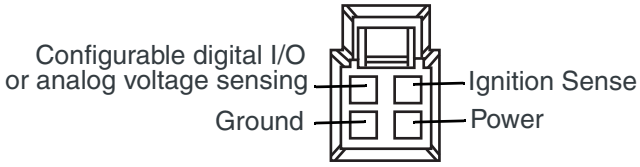

Figure 3-1: Power Connector Pin Diagram

Table 3-1: Power Connector Pin Description

Name	Pin	Description	Type
VCC	1	Main power supply for device.	PWR
GND	2	Main device ground.	PWR
IS	3	Ignition Sense: Used as the trigger for the low power mode and to turn the device on and off.	I
DIGIO	4	User configurable digital input/output or analog voltage sensing input.	I/O

Table 3-2: Power Supply Specifications

Name	Pin	Specification	Param	Min	Typ	Max	Units
VCC	1	Voltage range	VCC	7	12	28	V
		Ripple voltage	—	—	—	100	mVpp

Table 3-3: Ignition Sense, Digital Input/Output and Analog Voltage Sensing Pins Specifications

Pin	Name	Specification	Param	Min	Typ	Max	Units
3	IS (Input only)	Input low state voltage range	VIL	-0.3	0	1.2	V
		Input high state voltage range	VIH	2.0	—	30	V
		Input leakage current (3.3VDC IN)	IIN	—	350	—	µA

Table 3-3: Ignition Sense, Digital Input/Output and Analog Voltage Sensing Pins Specifications (Continued)

Pin	Name	Specification	Param	Min	Typ	Max	Units
4	DIGIO (Input)	Input low state voltage range	VIL	-0.5	0	1.2	V
		Input high state voltage range	VIH	1.3	3.3	30	V
		Input leakage current (3.3VDC IN)	IIN	—	58	—	uA
		Typical application input source is a dry switch contact to ground. Pin includes an internal 51KΩ pull up to 3.3VDC.					
	DIGIO (Output)	Open drain drive to ground	Idc	—	150	200	mA
		Maximum open circuit voltage applied	Voc	—	3.3	30	V
		V @ 200 MA	Voh	—	0.2	0.5	V
		Typical application is to drive a relay coil to ground. Pin includes an internal 51KΩ pull up to 3.3VDC. This output is not recommended as a current source.					
	DIGIO (Analog Voltage Input Only)	Input voltage range	VI	-0.3	0	30	V
		ADC resolution: 10 bits					
		Typical application is to monitor an analog voltage.					

The power connector has two user-configurable pins:

- **Ignition sense pin (pin 3)**. A qualified voltage on this pin (7–28VDC) turns on the device if qualified power is present on pins 1 and 2. It also is the input/enable for the device's low power mode.
- **Combination digital I/O line and analog input voltage sense pin (pin 4)**. This pin can be programmed to drive a relay, monitor a switch or respond to voltage levels.

Both are user configurable in ALEOS and are described in the ALEOS Configuration User Guide.

Serial Connector

You can connect the AirLink LS300's 9-pin serial connector directly to most computers or other devices with a standard straight-through cable. This connector is used for device configuration and debugging.

This connector complies with the EIA RS-232D specification for DCE equipment. The output driver levels swing from -7VDC to +7VDC with normal loading.

Note: If you have a DCE device, you need to use a null modem cable.

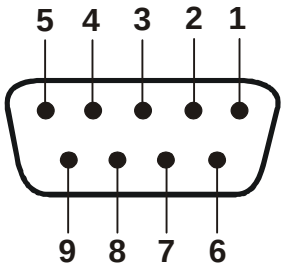

Figure 3-2: 9-Pin Serial Connector Diagram

Table 3-4: Serial Connector Pin-out

Name	Pin	Description	Type
DCD	1	Data Carrier Detect	OUT
TXD	2	Transmit Data	OUT
RXD	3	Receive Data	IN
DTR	4	Data Terminal Ready	IN
GND	5	Main GND. Connected internally to BOARD_GND	GND
DSR	6	Data Set Ready	OUT
RTS	7	Ready To Send	IN
CTS	8	Clear To Send	OUT
RI	9	Ring Indicator	OUT

Ethernet Connector

The LS300 has an Ethernet connector. This RJ-45 connector is a standard Ethernet port that can be used to connect any Ethernet-enabled device. Connect the LS300 directly to a computer or other Ethernet-enabled device with either a crossover cable or a straight-through cable.

Note: If you are connecting the LS300 to a hub or switch, use a straight-through cable or use the uplink port on the hub or switch with a cross-over cable.

This connector complies with the IEEE 802.3 specification for 100 Mbps speed (Fast Ethernet) with fallback to 10 Mbps and includes auto-crossover support. It is auto-sensing and auto-detects the speed of the connecting device for 100 baseT or 10 baseT.

It connects to the device's internal web server so that you can see and change the device's configuration and monitoring status with the ALEOS device management software. For more details on use and configuration, see the ALEOS Configuration User Guide.

The connector has two LEDs that indicate speed and activity. When looking into the connector:

- **Activity** –The right LED is solid yellow when a link is detected (the cable is plugged in) and blinks when there is activity.
- **Connection Speed** –The left LED is green to indicate a 100 Mbps link and orange when either no cable is connected or a 10 Mbps link is detected.

USB Connector

The LS300 has a Micro-B USB connector to support communication with a PC running Windows. It complies with USB Version 2.0 for high speed operation.

It can be dynamically configured to operate in one of two modes:

- **Virtual Ethernet Port**: The LS300 behaves as if the PC were connected to an Ethernet port, allowing access to the Internet and the LS300's internal web server. This is the default setting.
- **Virtual Serial Port**: The LS300 behaves as if it was connected to a standard serial port. The primary use of this interface is for the AT command line interface of ALEOS and for diagnostic access to the radio module.

A Windows driver must be installed on the PC in order to support USB use. The drivers are available for download on Sierra Wireless' support web site.

The ALEOS Configuration User Guide contains the details of USB mode configuration and driver installation.

Antenna Ports

The LS300 has 2 antenna ports. Both are SMA female bulkhead connectors.

- **Main antenna port:** This is the primary transmit and receive port for the radio.
- **Rx Diversity/GPS antenna port**: This is a dual function receive/diversity port and GPS receive port. When used for GPS, a bias supply may be enabled in the ALEOS software for use with active antennas.

Note: The diversity/GPS port is receive only, it does not transmit.

The LS300's cellular radio provides an IP level interface to connect the device to the Internet. It can also function as an Internet gateway for a PC connected to the USB device port.

You can manage the LS300 remotely with one of the following:

- Embedded ACEmanager web server
- AT commands using the remote telnet server
- AirVantage Management Service

Table 3-5: Main Antenna Specifications

Parameter	Min	Typ	Max	Units	Notes
Impedance	—	50	—	Ω	Antenna load impedance
VSWR	—	—	2.5:1	—	Maximum allowed VSWR of antenna
Gain	—	—	5	dBi	Low band, including cable loss (for FCC and CE compliance)
	—	—	4	dBi	High band, including cable loss (for FCC and CE compliance)

Table 3-6: Rx/Diversity Antenna Specifications

Parameter	Min	Typ	Max	Units	Notes
Impedance	—	50	—	Ω	Antenna load impedance
VSWR	—	—	2.5:1	—	Maximum allowed VSWR of antenna

Table 3-7: GPS Active Antenna Specifications

Parameter	Min	Typ	Max	Units	Notes
Impedance	—	50	—	Ω	Antenna load impedance
VSWR	—	—	2.5:1	—	Maximum allowed VSWR of antenna
3D Gain	-5	—	—	dBi	Average

Table 3-7: GPS Active Antenna Specifications (Continued)

Parameter	Min	Typ	Max	Units	Notes
Isolation	10	—	—	dB	GPS to Main in all relevant bands
Power	3.0 —	3.3 30	3.5 125	V mA	External GPS antenna supply. This supply is short circuit protected. This protection will turn off the supply if the maximum current is exceeded until the fault condition is removed.

Table 3-8: CDMA Frequency Bands

Band	Parameter	Frequency
BC0 (US Cellular)	Tx frequency band	824 – 849 MHz
	Rx frequency band	869 – 894 MHz
	Radio performance	Class III
BC1 (US PCS)	Tx frequency band	1850 – 1910 MHz
	Rx frequency band	1930 – 1990 MHz
	Radio performance	Class II

Table 3-9: HSPA North American Frequency Bands

Band	Parameter	Frequency
Band I WCDMA 2100	Tx frequency band	1920 – 1980 MHz
	Rx frequency band	2110 – 2170 MHz
	Radio performance	Class III
Band II WCDMA 1900	Tx frequency band	1850 – 1910 MHz
	Rx frequency band	1930 – 1990 MHz
	Radio performance	Class III
Band V WCDMA 850	Tx frequency band	824 – 849 MHz
	Rx frequency band	869 – 894 MHz
	Radio performance	Class III
Band VI WCDMA 800	Tx frequency band	830 – 840 MHz
	Rx frequency band	875 – 885 MHz
	Radio performance	Class III

Table 3-10: HSPA Rest of the World Frequency Bands

Band	Parameter	Frequency
Band I WCDMA 2100	Tx frequency band	1920 – 1980 MHz
	Rx frequency band	2110 – 2170 MHz
	Radio performance	Class III
Band VIII WCDMA 900	Tx frequency band	880 – 915 MHz
	Rx frequency band	925 – 960 MHz
	Radio performance	Class III

Table 3-11: GSM/GPRS/EGPRS Frequency Bands

Band	Parameter	Frequency
GSM 850	Tx frequency band	824 – 849 MHz
	Rx frequency band	869 – 894 MHz
	Radio performance	GPRS Class 4 EGPRS Class E2
GSM 900	Tx frequency band	880 – 915 MHz
	Rx frequency band	925 – 960 MHz
	Radio performance	GPRS Class 4 EGPRS Class E2
GSM 1800	Tx frequency band	1710 – 1785 MHz
	Rx frequency band	1805 – 1880 MHz
	Radio performance	GPRS Class 1 EGPRS Class E2
GSM 1900	Tx frequency band	1850 – 1910 MHz
	Rx frequency band	1930 – 1990 MHz
	Radio performance	GPRS Class 1 EGPRS Class E2

Power Consumption

Note: These are typical values, in mA, @12VDC

- **HSPA+**: Idle: 224; Typ.: 245; Max.: 430
- **CDMA**: Idle 220; Typ.: 257, Max.: 427
- **Low Power Standby Mode** (All models): <68

SIM Socket (HSPA Devices)

- The SIM socket is a 6-pin socket operated at 1.8V/3.3V.
- This interface is compliant with the applicable 3GPP standards for USIM.

GPS Specifications

Table 3-12: GPS Performance

Description	EV-DO (SL501x)	HSPA+ (SL809x)
Satellite Channels	12 channel, continuous tracking	TBD
Protocols	TAIP, NMEA	TAIP, NMEA
Acquisition Times	Re-acquisition: Hot start: 9 sec. Cold start: 39 sec.	Hot start: < 3 sec. Cold start: < 45 sec.
Accuracy (Horizontal)	< 3m (50%), < 8 m (90%) Velocity: 0.06 m/sec.	< 10 m (open sky)
Sensitivity	Acquisition: -158 dBm Tracking: -160 dBm Cold start: -145 dBm	Acquisition: -153 dBm Tracking: -155 dBm Cold start: -145 dBm
Operational Limits	Velocity: 515 m/sec.	TBD

LED Indicators

There are four LEDs on the front panel. They are labeled:

- Network
- Signal
- Activity
- Power

When on, each LED can be:

- Red
- Green
- Yellow
- Off

When on, each LED can be:

- Solid on
- Flashing

The LEDs may be viewed from the top or front. For more information on LED functionality, refer to the LS300 User Guide.

4: Mechanical and Environmental Specifications

The AirLink LS300 complies with the mechanical and environmental specifications in this section.

Environmental Specifications

Table 4-1: Operational / Non-Operational Environmental Specifications

Category	Op / Non-op	Reference
Vibration	Operational	IEC 60068-2-64
Mechanical Shock	Operational	MIL-STD-810F, 516.5C, Procedure I
Drop	Non-operational	MIL-STD-810F, Method 516.5D
Temperature	Operational	MIL-STD-810F, 501.4, 502.4 -30ºC to +70ºC (-22ºF to +158ºF) -40ºC to +85ºC (-40ºF to +185ºF) at reduced RF level
	Non-operational	MIL-STD-810F, 501.4, 502.4 -40ºC to +85ºC (-40ºF to +185ºF)
Electrostatic Discharge	Operational	IEC 61000-4-2
Surface Abrasion	Non-operational	IEC 60068-2-70 Part 2, Test Xb
Relative Humidity	Non-operational	MIL-STD-810F, 507.4
IP Rating	Non-operational	IEC 60529 – IP64
Cargo Vibration	Non-operational	ISTA 2A 2001, test categories 1, 4, 5, & 6

Table 4-2: Environmental Specifications

Category	Reference
Free Fall Test	IEC 60068-2-2
Low Storage Temperature	IEC 60068-2-1
Thermal Shock	MIL-STD-810, Method 501.4, 502.4
Water Resistance Test	IEC 60529

Reliability Specifications

The LS300 has a MTBF of 10.7 years for both CDMA and HSPA versions.

MTBF calculations are performed per:

- Telcordia “Reliability Prediction Procedure for Electronic Equipment” document number SR-332, Issue 1
- Method I (parts count) is used

MTBF is based on Accelerated Life Test (ALT). The ALT sequence acceleration factor is calculated using classical reliability formulas like:

- Arrhenius Temperature Acceleration Model
- Peck Temperature Humidity Acceleration Model
- Coffin–Manson Temperature Cycle Acceleration Model
- Power Spectral Density Power Law–Vibration Acceleration Model

Mechanical Specifications

Table 4-3: Mechanical Specifications

Length	76 mm (3.0 in) Excluding SMA's
Width	90 mm (3.5 in) Excluding DB-9
Height	25 mm (1.0 in)
Weight	190 g (6.7 oz)

Construction Materials

The LS300 case is die cast using aluminum alloy A380, which is powder coated gray.

RoHS

The LS300 complies with the Restriction of Hazardous Substances Directive (RoHS). This directive restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment.

Labeling

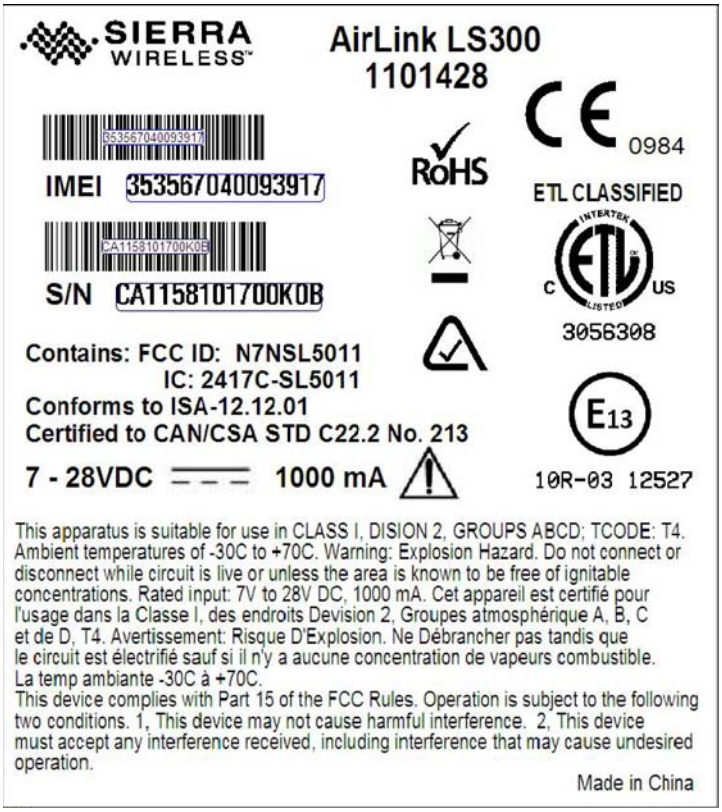

Figure 4-1: LS300 label (19.4 mm x 28.2 mm)

The LS300 label is non-removable and contains:

- Sierra Wireless logo and product name (LS300)
- IMEI or ESN
- Serial number
- SKU number (when required)
- Factory serial number in alphanumeric format, with date code
- Licensed vendor logo
- May have an operator designation applied

5: Regulatory Information

Federal Communications Commission Notice (FCC United States)

Electronic devices, including computers and wireless devices, generate RF energy incidental to their intended function and are therefore subject to FCC rule and regulations. This equipment has been tested to, and found to be within the acceptable limits for a Class A digital device, pursuant to part 15 of the FCC Rules.

This equipment generates radio frequency energy and is designed for use in accordance with the manufacturer's user manual. However, there is no guarantee that interference will not occur in any particular installation.

If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

This device complies with Part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference.

Warning: *Changes or modifications to this device not expressly approved by Sierra Wireless could void the user's authority to operate this equipment.*

Notice for Canadian Users

This Class A digital apparatus complies with ICES-003.

Antenna Considerations

Although the antenna mode(s) used with these devices meet(s) the Industry Canada Radio Frequency requirements, it is possible that future customers may swap them for different ones without the

network provider's knowledge and approval. Such customers must be made aware of, and follow, the radio frequency requirements applied in this technical approval:

- RSS-102 "Radio Frequency Exposure Compliance for Radio Communication Apparatus (All Frequency Bands)."
- RSS-129 "800 MHz Dual-Mode CDMA Cellular Telephones."
- RSS-132e "Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz."

RF Exposure

In accordance with FCC/IC requirements of human exposure to radio frequency fields, the radiating element shall be installed such that a minimum separation distance of 20cm should be maintained from the antenna and the user's body.

Warning: *This product is only to be installed by qualified personnel!*

To comply with FCC/IC regulations limiting both maximum RF output power and human exposure to RF radiation, the maximum antenna gain must not exceed the specifications listed below for the device used.

		FCC ID/IC Number	
		N7NSL8090 / 2417C-SL8090	**N7NSL5011 / 2417C-SL5011**
Antenna Gain	Cellular Band	6.2 dBi	8.5 dBi
	PCS Band	3.8 dBi	4.15 dBi

EU

Sierra Wireless hereby declares the AirLink LS300 devices conform to all the essential requirements of Directive 1999/5/EC.

Products are marked with a CE and notified body number.

CE 0682

The Declaration of Conformity made under Directive 1999/5/EC is available for viewing at the following location in the EU community.

Sierra Wireless (UK) Limited

Suite 5, The Hub Fowler Avenue

Farnborough Business Park

Farnborough, United Kingdom GU14 7JP

WEEE Notice

If you purchased your AirLink LS300 in Europe, please return it to your dealer or supplier at the end of its life. WEEE products may be recognized by their wheeled bin label on the product label.

A: References

A

Sierra Wireless Documents

- AirLink LS300 User Guide
- ALEOS Configuration User Guide

Regulatory Standards

- 47 CFR - Parts 2, 15, 22, 24
- Industry Canada RSS-132
- Industry Canada RSS-133
- R&TTE Directive 1999/5/EC
  - EMC standards
    - EN 301 489-1
    - EN 301 489-7
    - EN 301 489-24
  - Radio Spectrum standards
    - EN 301 908-1
    - EN 301 908-2
    - EN 301 511
  - Safety
    - IEC 60950-1:2005 (2nd Edition); Am 1:2009
    - EN60950-1:2006 +All:2009
  - RoHS
- PTCRB
- Hazardous Locations
  - ISA 12.12.01 “Nonincendive Electrical Equipment for Use in Class I and II, Division 2, and Class III, Divisions 1 and 2 Hazardous (Classified) Locations”—Formerly ANSI/ISA-S12.12-1994
  - CSA C22.2#213 “Nonincendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations”

B: Acronyms

B

Table B-1: Acronyms

Acronym or term	Definition
1xEV-DO	Single Carrier (1X) EVolution–Data Only A high-speed standard for cellular packet data communications. It supports Internet connections with data rates up to 3.1 Mbps. (downlink from the network) and 1.8 Mbps (uplink to the network). Average data rates are approximately: • Rev. A: 600-1300 kbps. (downlink from the network) and 300-400 kbps (uplink to the network) • Rev. 0: 400-700 kbps (downlink from the network) and 40-80 kbps (uplink to the network) Actual speed depends on the network conditions. Compare to 1X.
1X	Single Carrier (1X) Radio Transmission Technology A high-speed standard for cellular packet data communications. 1x supports Internet connections with data rates up to 153 kbps (simultaneously in each direction—downlink and uplink). Actual speed depends on the network conditions. Compare to 1xEV-DO.
3GPP	3rd Generation Partnership Project 3GPP unites 6 telecommunications standard development organizations (ARIB, ATIS, CCSA, ETSI, TTA, TTC), and provides their members with a stable environment to produce Reports and Specifications that define 3GPP technologies.
API	Application Programming Interface A protocol intended to be used as an interface by software components to communicate with each other.
AT	A set of device commands, preceded by “AT” originally developed by Hayes, Inc. for their devices. The structure (but not the specific commands, which vary greatly from manufacturer to manufacturer) is a de facto device industry standard.
CDG	CDMA Development Group A consortium of companies who joined together to lead the adoption and evolution of CDMA wireless systems around the world. Also see CDMA.
CDMA	Code Division Multiple Access A wideband spread spectrum technique used in digital cellular, personal communications services, and other wireless networks. Wide channels (1.25 MHz) are obtained through spread spectrum transmissions, thus allowing many active users to share the same channel. Each user is assigned a unique digital code, which differentiates the individual conversations on the same channel.

Table B-1: Acronyms (Continued)

Acronym or term	Definition
cdmaOne	A IS-95 CDMA standard developed by QUALCOMM Inc. Also known as TIA-EIA-95
CE, CE label	The CE label is a mandatory conformity marking for products placed on the market in the European Economic Area (EEA). With the CE marking on a product, the manufacturer declares that the product conforms with the essential requirements of the applicable EC directives.
CnS	Sierra Wireless' proprietary Control and Status protocol interface
DCE	Data Communications Equipment A device that sits between the data terminal equipment (DTE) and a data transmission circuit. Usually the DCE is a modem.
Diversity	Antenna diversity, also called space diversity, is a scheme that uses two or more antennas to improve the quality and reliability of a wireless link. Often, especially in urban and indoor environments, there is no clear line-of-sight (LOS) between transmitter and receiver. Instead the signal is reflected along multiple paths before finally being received. Each bounce can introduce phase shifts, time delays, attenuations, and distortions that can destructively interfere with one another at the aperture of the receiving antenna.
EDGE	Enhanced Data rates for GSM Evolution A digital mobile phone technology that allows improved data transmission rates as a backward-compatible extension of GSM. EDGE is considered a pre-3G radio technology and is part of ITU's 3G definition. Also known as Enhanced GPRS (EGPRS), or IMT Single Carrier (IMT-SC), or Enhanced Data rates for Global Evolution.
EIA	Electronics Industry Association EIA was a standards and trade organization composed as an alliance of trade associations for electronics manufacturers in the United States. They developed standards to ensure the equipment of different manufacturers was compatible and interchangeable. The EIA ceased operations on February 11, 2011, but the former sectors continue to serve the constituencies of EIA.
EMC	Electro Magnetic Compatibility The branch of electrical science which studies the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects (Electromagnetic interference, or EMI) that such energy may induce.
EMI	Electro Magnetic Interference The disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source.
ERP	Effective Radiated Power A standardized theoretical measurement of radio frequency (RF) energy. It is determined by subtracting system losses and adding system gains.

Table B-1: Acronyms (Continued)

Acronym or term	Definition
ESN	Electronic Serial Number The unique first-generation serial number assigned to the LS300 for use on the wireless network. Compare to MEID.
Ethernet	Computer networking technologies for local area networks (LANs).
EU	The European Union Organization of European countries.
EV-DO	Enhanced Voice-Data Optimized or Enhanced Voice-Data Only (Ev-DO, EV, EVDO, etc.). A telecommunications standard for the wireless transmission of data through radio signals, typically for broadband Internet access. It uses multiplexing techniques including code division multiple access (CDMA) as well as time division multiplexing (TDM) to maximize both individual users' throughput and the overall system throughput.
FCC	Federal Communications Commission The U.S. federal agency responsible for interstate and foreign communications. The FCC regulates commercial and private radio spectrum management, sets rates for communications services, determines standards for equipment, and controls broadcast licensing.
FW	Firmware Software stored in ROM or EEPROM; essential programs that remains even when the system is turned off. Firmware is easier to change than hardware but more permanent than software stored on disk.
GPRS	General Packet Radio Service A packet-oriented mobile data service on 2G and 3G cellular communication systems. GPRS was originally standardized by European Telecommunications Standards Institute (ETSI) in response to the earlier CDPD and i-mode packet-switched cellular technologies. It is now maintained by the 3rd Generation Partnership Project (3GPP).
GPS	Global Positioning System A system that uses a series of 24+ satellites to provide navigational data.
GSM	Global System for Mobile Communications (originally Groupe Spécial Mobile) GSM is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones.
HSPA	High Speed Packet Access An amalgamation of two mobile telephony protocols: High Speed Downlink Packet Access (HSDPA) and High Speed Uplink Packet Access (HSUPA). This extends and improves the performance of existing 3rd generation mobile telecommunication networks utilizing the WCDMA protocols.

Table B-1: Acronyms (Continued)

Acronym or term	Definition
HSPA+	Also called evolved HSPA This allows bit-rates to reach as high as 168 Mbit/s in the downlink and 22 Mbit/s in the uplink. An improved 3GPP standard.
IC	Industry Canada The government department responsible for overseeing and regulating wireless and communication technologies in Canada.
IEC	International Electrotechnical Commission A non-governmental international standards organization that prepares and publishes International Standards for all electrical, electronic and related technologies – collectively known as "electrotechnology."
IOTA	Internet Over The Air An automated feature, supported by some service providers, to perform account setup by making a connection to the CDMA network and using a secure Internet connection to download account parameters to the device.
IS	Interim Standard After receiving industry consensus, the TIA/EIA forwards the standard to ANSI for approval.
IS-95	A 2G mobile telecommunications standard using CDMA to send voice, data and signaling data (such as a dialed telephone number) between mobile telephones and cell sites.
ITU	International Telecommunication Union A specialized agency of the United Nations responsible for issues that concern information and communication technologies. The ITU coordinates the shared global use of the radio spectrum, promotes international cooperation in assigning satellite orbits, and assists in the development and coordination of worldwide technical standards.
kbps	Kilobits per second 1000, not 1024, as used in computer memory size measurements of kilobytes.
LED	Light Emitting Diode A semiconductor diode that emits visible or infrared light.
LTE	Long Term Evolution High performance air interface for cellular mobile communication systems.
Mbps	Millions of bits per second, or Megabits per second.
MEID	Mobile Equipment IDentifier The unique second-generation serial number assigned to the device for use on the wireless network. Compare to ESN.

Table B-1: Acronyms (Continued)

Acronym or term	Definition
NAM	Number Assignment Module Semi-permanent information stored in the device's non-volatile memory, including the device's Mobile Identification Number, the station class mark, carrier code, and other cellular identifiers. Essentially the phone number, it should be treated as confidential information and should not be disclosed to anyone other than the cellular service provider
NV	Non-Volatile (memory)
OEM	Original Equipment Manufacturer A company that manufactures a product and sells it to a reseller.
OTAPA	Over the Air Parameter Administration A way of distributing new software updates or configuration settings to devices like cellphones and set-top boxes.
OTASP	Over the Air Service Provisioning. Also see OTAPA.
PCS	Personal Communications Services A cellular communication infrastructure that uses a different frequency range than AMPS
PPP	Point to Point Protocol An alternative communications protocol used between computers, or between computers and routers on the Internet. PPP is an enhanced SLIP. Also see SLIP.
PRI	Product Release Instructions A file containing the settings used to configure devices for a particular service provider, customer, or purpose.
RF	Radio Frequency
RoHS	Restriction of use of Hazardous substances mandated by EU Directive 2002/95.
RS-232	A series of standards for serial binary single-ended data and control signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports.
Rx	Receive
SIM, SIM card	Subscriber identity module or subscriber identification module. An integrated circuit which securely stores the international mobile subscriber identity (IMSI) and the related key used to identify and authenticate subscribers on mobile telephony devices (such as mobile phones and computers).
SKU	Stock Keeping Unit Identifies an inventory item: a unique code, consisting of numbers or letters and numbers, assigned to a product by a retailer for purposes of identification and inventory control.

Table B-1: Acronyms (Continued)

Acronym or term	Definition
SLIP	Serial Line Internet (or Interface) Protocol An Internet Protocol designed to work over serial ports and modem connections. On personal computers, SLIP has been largely replaced by the Point-to-Point Protocol (PPP), which has more features and does not require its IP address configuration to be set before it is established. On microcontrollers SLIP is still the preferred way of encapsulating IP packets due to its very small overhead. Also see PPP.
SMS	Short Message Service A feature which allows users of a wireless device on a wireless network to receive or transmit short electronic alphanumeric messages (up to 160 characters, depending on the service provider).
TIA/EIA	Telecommunications Industry Association / Electronics Industry Association A standards setting trade organization, whose members provide communications and information technology products, systems, distribution services and professional services in the United States and around the world.
Tx	Transmit
UMTS	Universal Mobile Telecommunications System A third generation mobile cellular system for networks based on the GSM standard. Developed and maintained by the 3GPP (3rd Generation Partnership Project), UMTS is a component of the International Telecommunications Union IMT-2000 standard set and compares with the CDMA2000 standard set for networks based on the competing cdmaOne technology.
USB	Universal Serial Bus An industry standard defining the cables, connectors and communications protocols used in a bus for connection, communication and power supply between computers and electronic devices.

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