



StreamCaster Lite SL5200/LC5200 Basic OEM Integration Manual

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Silvus warrants the performance of its products to the specifications applicable at the time of sale in accordance with Silvus' standard warranty.

Revision History

Version	Date	Changes
1.0	Feb 26, 2025	Initial released

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1 Overview

This document describes the SL5200 OEM module and how to integrate the unit into end-user configurations.

The SL5200 OEM module is simplified mechanically and utilizes standardized connectors for power, control and input/output connections when compared with the SC4200 OEM unit.

The LC5200 OEM module is a variant of the SL, offering more limited performance to reduce cost of the unit. The interface and dimensions are identical to the standard SL5200.

Figure 1 shows the OEM module that consists of a single printed circuit board (PCB) assembly that is sandwiched between a bottom and top metal plate. These plates provide both EMI shielding and thermal heat conductivity for the PCB.

The remaining sections provide details regarding mounting the unit, providing power and connectivity to the unit and details concerning heat management.



Figure 1. SL5200-OEM Module

2 Mounting and Dimensions

Figure 2 through Figure 4 show the key dimensions of the OEM module necessary to facilitate mounting. Please refer to Section 4 for guidance in providing proper heat management when mounting the module in embedded configurations. Thread and Screw size are M2.

For more detailed dimensions of the OEM unit, users may refer to the 3D step mechanical design file that is included in the OEM integration guideline package.

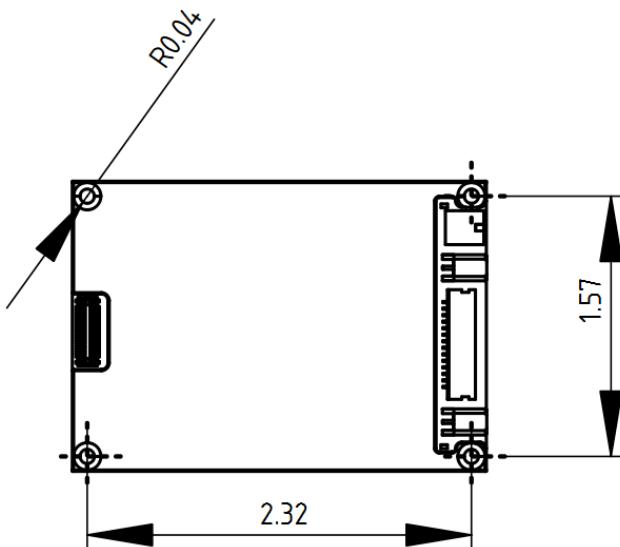


Figure 2. SL5200 OEM Top View (Dimensioned)

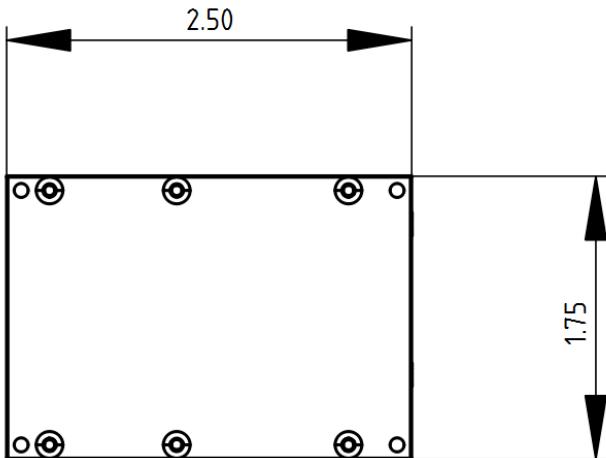


Figure 3. SL5200 OEM Bottom View (Dimensioned)

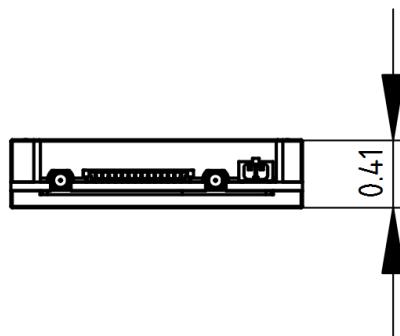


Figure 4. SL5200 OEM End View (Dimensioned)
(note: For exact dimensions, please refer to STEP file)

3 Weight

The SL5200 OEM module weighs 52.9g including thermal pads installed on both the top and bottom shields.

4 Interface Connections

Figure 5 below illustrates the interface connection locations for the OEM unit. Table 1 maps the locations against the PCB reference nomenclature.

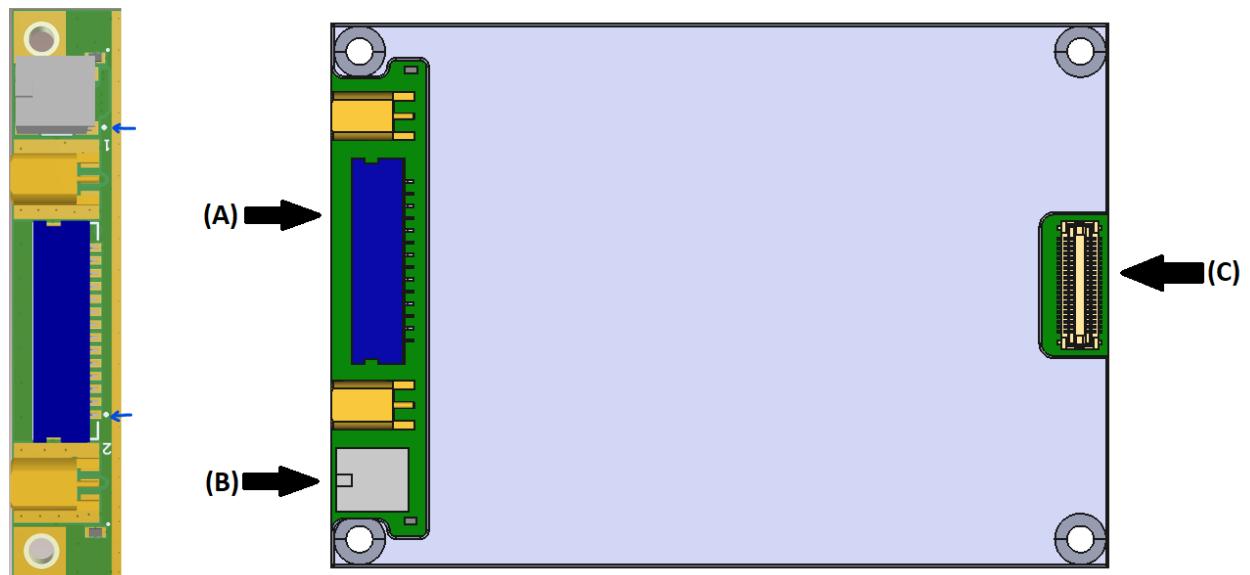


Figure 5. SL5200-OEM Interfaces (white dots are pin 1)

Table 1. SL4200 Interfaces and Connector Types

Fig 5 Ref	PCB Nom	Description
A	J9001	I/O Connector
B	J9002	Power Connector
C		Debug Connector (Factory use only)

Table 2 details the individual pinout for the PWR connector. RF1 and RF2 are SMPM (m) connectors.

Table 2. PWR Connector Interface (B: J9002)

Pin #	Description	Comments/Notes
1	VBAT_IN	Input voltage range 9V-36V
2	GND	Ground connection

5 Power Consumption and Heat Management

5.1 Power configurations

As detailed in Table 4, for the 0.5W configuration (e.g., 0.25W per antenna port), the average power consumption ranges from 3.6W to 9W, depending on the transmission duty cycle and frequency band. In the 1W configuration (e.g., 0.5W per antenna port), the average power consumption ranges from 3.6W to 11W, depending on the transmission duty cycle and frequency band. In the 2W configuration (1.0W per antenna port), average power consumption ranges from 3.6 to 13W depending on the transmission transmission duty cycle and frequency band.

While the radio is listening on air, it consumes 3.6W. The table below shows max power consumption based on transmit power and frequency band.

Table 4. Power Consumption

Radio Model/Tx Pwr	Silvus PN	Power Consumption	(L-band) Max ¹ Power	(S-band) Max ¹ Power	(L-band) Peak ² Power	(S-Band) Peak ² Power
SL5200 - 0.5W	SL5205	4-9 W	9 W	8 W	10 W	9 W
SL5200 - 1W	SL5210	4-11 W	11 W	9 W	12 W	10 W
SL5200 - 2W	SL5220	4-13 W	13 W	11 W	14 W	12 W
⁽¹⁾ Max power occurs with 100% air-time usage ⁽²⁾ Peak power occurs at beginning of packet transmission and lasts ~100µs						

5.2 Thermal management

In general, it is recommended to mount the SL5200 onto a large thermally conductive surface and install an additional heat sink on the top side of the stack as needed.

If one desires to do a thermal analysis and simulation, please use the following guideline.

- Most of the 3.6W idle state power consumption is dissipated to the top shield of the SL5200 OEM stack.
- Most of the RF power amplifier power consumption is dissipated to the bottom shield of the SL5200 OEM stack.

- To estimate the expected power consumption, Silvus recommends using the Silvus RF link budget tool to derive the expected transmission duty cycle.

Below are a few examples of power distribution analysis for SL5200.

- The SL5200 is transmitting at 1W power in the S-band with an estimated duty cycle of 80%, therefore the average power consumption would be $9W*0.8+3.6W*0.2 = 7.9W$. This breaks out to approximately 3.6W allocated to the top shield and 4.3W to the bottom shield.
- The SL5200 is transmitting at 2W power in the L-band with an estimated duty cycle of 80%, therefore the average power consumption would be $13W*0.8+3.6W*0.2 = 11.1W$. The allocation yields approximately 3.6W to the top shield and 7.5W to the bottom shield.
- The SL5200 is transmitting at 1W power in the S-Band at duty cycle of 50%, the average power consumption would be $9W*0.5+3.6W*0.5 = 6.3W$. The allocation yields approximately 3.6W to the top shield and 2.7W to the bottom shield.

StreamCaster radios have internal sensors for temperature monitoring that limit the transmission duty cycle to prevent equipment damage if the operating temperature becomes excessive. These levels are set at the factory but can be reconfigured within the radio as detailed in the radio manual (e.g., if internal temperature sensors read 75°C, transmit back-off begins with no transmissions allowed once 85°C is reached). We recommend that the default settings be used unless mission profiles demand otherwise.

Silvus recommends that the case temperature not exceed 70°C to keep internal temperatures below the transmitter limiting thresholds (as discussed above). Use of high-efficiency thermal conductive pads from [TennVac](#) or their equivalent, or using thermal conductive paste, in attaching properly sized and designed heat sinks will greatly assist in removing heat from the radio module.

The dimensions of the heat sink, height, and shape of the fins, the spacing between fin channels, the thickness of the base material, as well as the thermal conductivity of the metal, all play a role in determining thermal dissipation efficiency. Of course, air movement through and around the heatsink can significantly increase cooling effectiveness.

Once a thermal design is implemented, monitor the case temperature as environmental and operational conditions are reached to ensure that the design provides sufficient thermal cooling indicated by measuring the OEM module case temperature so that it does not exceed 70°C (or internal temperature exceed 75°C).

For further information and details please refer to our paper entitled “StreamCaster Radio Power Consumption and Profiles”.

6 OEM Accessories

6.1 Accessory table

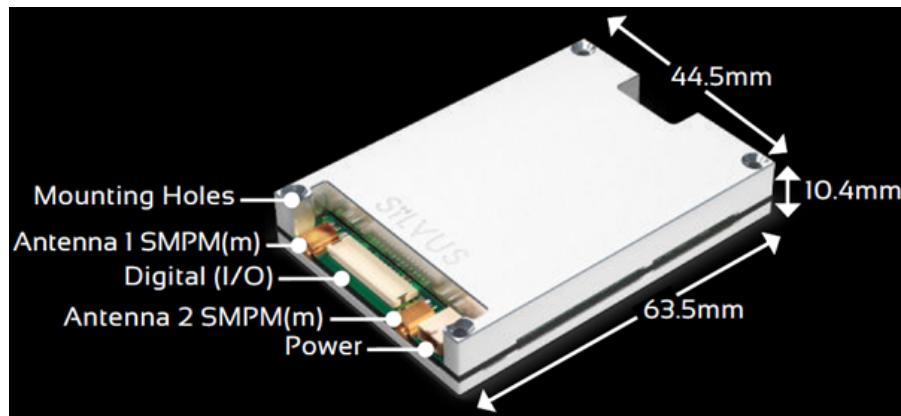
Table 5. SL5200 OEM Accessories List

Silvus PN	Description
SL52-OEMCBL-PWR-12I	12-inch SL5200 OEM 2-pin (m) Switchcraft power cable.
SL52-OEMCBL-PWR-24I	24-inch SL5200 OEM 2-pin (m) Switchcraft power cable.
SL52-OEMCBL-PWR-BC-24I	24-inch SL5200 OEM 2-pin (m) blunt cut
SL52-OEMCBL-IO-ESU-18I	18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB OTG (micro-B) connection
SL52-OEMCBL-IO-ESUH-18I	18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB Host (Type A female) connection. (Radio=Host)
SL52-OEMCBL-IO-ESUH-36I	36-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB Host (Type A female) connection. (Radio=Host)
SL52-OEMCBL-IO-ESUC-18I	18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB Client (Type A male) connection. (Radio=Client)
SL52-OEMCBL-IO-E-12I	12-inch SL5200 OEM data cable. Provides Ethernet branch only.
SL52-OEMCBL-IO-BC-24I	24-inch SL5200 OEM data cable blunt cut
SL52-RF-RASM-TNC-12I	RF Cable 12-inches, RA SMPM jack, straight TNC (f) flange version
SL52-RF-SM-TNC-12I	RF Cable 12-inches, straight SMPM jack, straight TNC (f) flange version
SL52-RF-RASM-SMA-80mm	RF Cable 80mm, straight SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)
SL52-RF-RASM-SMA-12I	RF Cable 12-inches, RA SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)
SL52-RF-SM-SMA-3I	RF Cable 3-inches, straight SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)
SL52-RF-SM-SMA-6I	RF Cable 6-inches, straight SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)
SL52-RF-SM-SMA-9I	RF Cable 9-inches, straight SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)
SL52-RF-SM-SMA-12I	RF Cable 12-inches, straight SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA)

7 FCC ID: N2S-SL52-245-OEM (Modular Certification)

The following Silvus radio models are approved for modular certification by FCC under the following ID: **FCC ID: N2S-SL52-245-OEM**

- ❖ SL5220-139235-O, SL5220-139235F-O
- ❖ SL5210-139235-O, SL5210-139235F-O
- ❖ LC5220-139235-O, LC5220-139235F-O
- ❖ LC5210-139235-O, LC5210-139235F-O
- ❖ LC52.50-139235-O, LC52.50-139235F-O



- Equipment Class: Digital Transmission System
- Frequency band: 2.4GHz, ISM-band
- Bandwidth: 10 & 20MHz
- Frequency range:
 - Tx BW=20MHz, F-mid=2440MHz only, no frequency range
 - Tx BW=10MHz, 2416-2457MHz
- Maximum output power:
 - Maximum 20MHz Bandwidth Output Power @ 2440MHz: 0.979W
 - Maximum output power for 20MHz @ operating frequency spectrum should not exceed 27dBm/0.5W/antenna
 - Maximum 10MHz Bandwidth Output Power @ 2416MHz: 0.241W
 - Maximum 10MHz Bandwidth Output Power @ 2440MHz: 0.247W
 - Maximum 10MHz Bandwidth Output Power @ 2457MHz: 0.25W
 - Maximum output power for 10MHz @ operating frequency spectrum should not exceed 24dBm/0.25W/antenna
- Recommended Antennas: ~2.5dBi Omni Antennas (Silvus PN# AOV2S192G-TM) or equivalent for FCC 2.109 & 15.247 RF Exposure compliance
- DC supply: the customer provides DC power from their own DC supply source; the supply should be fused for 5-amp circuit.

Modular approval allows installation in different end-use products by an OEM with limited or no additional testing or equipment authorization for the transmitter function provided by the SL/LC52xx-139235/F-O:

- ❖ No additional transmitter compliance testing is required if the module is operated with an approved antenna.
- ❖ No additional transmitter compliance testing is required if the module is operated with the same general type of antenna listed as approved in the SL/LC52xx-139235/F-O documentation.
- ❖ Acceptable antennas must be of equal or less far field gain than the antenna previously authorized under the same FCC ID and must have similar in band and out of band characteristics.

The end-product must comply with all applicable FCC equipment authorizations, regulations, requirements and equipment functions not associated with the SL/LC52xx-139235/F-O.

Compliance must be demonstrated to regulations for other transmitter components within the host product, to requirements for unintentional radiators (Part 15B), and to additional authorization requirements for the non-transmitter functions.

The OEM applying the SL/LC52xx-139235/F-O are required to include all FCC statements and warnings detailed in the following sections to the end-product labeling and in the finished product manual.

Product Label

A statement must be included on the exterior of the final OEM product which communicates that the device identified by the FCC ID number is contained within the product. Include the statement:

- Contains FCC ID: **N2S-SL52-245-OEM**

Additionally, the OEM must include the following statements on the exterior of the finished product:

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including any interference that may cause undesired operation.

User Manual (Customer end-product)

Any user documentation that accompanies the end-product must include the following information in a location that is easily read:

- To comply with FCC's RF radiation exposure requirements, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20 cm is maintained between the reader (antenna) & user's/nearby people's body at all times and must not be collocated or operating in conjunction with another antenna or transmitter.

The finished product manual must contain the following statement:

- **WARNING:** The Federal Communications Commission warns that changes or modifications of the radio module within this device not expressly approved by Silvus Technologies, Inc. could void the user's authority to operate the equipment.

In the case where an OEM seeks class B (residential) limits for the host product, the finished product manual must contain the following statement:

- **NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is 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 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/TV technician for help

In the case where an OEM seeks the lesser category of a Class A digital device for their finished product, the following statement must be included in the manual of the finished product:

- **NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.