CrossLink AI

Technical manual

crosscontrol

Contents

Revision history

Rev	Date	Comments
C	2019-05-15	

1. Introduction

CrossLink AI is a global wireless access module for CrossControl CCpilot displays. It features WLAN, 3G/GPRS modem and GNSS/GPS functionality in a single, compact and sturdy module. It holds radio certification for all major markets and the radio modules used inside make additional certification possible on request. It is connected to your CCpilot display via USB and you easily add wireless connectivity functions in your system through a full-fledged API for Linux.

This manual describes how the CrossLink AI should be used.

1.1. Functions and features

The CrossLink AI can be used to provide operational and diagnostic data remotely for the equipment available, via the 3G/GPRS modem or WLAN.

You can use the CrossLink AI to connect to a Smart device. You can develop your Smartphone app through the LinX Software Suite which has ready built tools to facilitate quick development. Creating an easy way to offer your customers a "My machine" app or offering your Field Service staff an easy way of accessing your vehicle system for fault finding.

GNSS/GPS can be used for on-board GIS/mapping application on CCpilot displays or provide position data in your asset management system.

Power can be supplied to the CrossLink AI with separate +12 or +24Vdc, or directly from the USB[1].

The following features are available on respective part number of the CrossLink AI

Part number	Dedicated power	Power over USB	3G/GPS/GNSS	WLAN
C000 138-30	Yes	No	Yes	Yes
C000 138-34	Yes	No	No	Yes
C000 138-40	No	Yes	Yes	Yes

1.2. Technical data

Positioning	
System coverage	Concurrent GPS and GLONASS
SBAS	WAAS, EGNOS, MSAS
Accuracy @ open sky	<1,5 m. CEP-50

MODEM	
Generation	3G
Frequency bands	800/850/900/1900/2100MHz@UMTS 850/900/1800/1900MHz@GSM
Uplink/Downlink speed (MBPS)	Up to 14.4/5.76
GPRS/EDGE	Multi-slot class 12
Dual antennas	Option to use diversity antenna in addition to main antenna. The diversity antenna increases the robustness of the

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[1] Requires a 2A USB port on the host

	connection to the network and results in faster data throughput speeds.
SIM-card type	Micro-SIM

WLAN	
WLAN	Dual band, 2.4 GHz and 5 GHz, IEEE 802.11 a/b/g/n
Modes	**Client** - Makes CrossLink AI a client device that can connect to available WLAN networks. **Access point** - Makes CrossLink AI an access point to which other WLAN devices can connect. **WiFi direct** - Enables CrossLink AI to easily connect with other devices without requiring a wireless access point. (Requires Linux 3.10 or higher.) Modes are controlled in the software application of the host to which CrossLink AI is attached, e.g. a CCpilot or CrossCore device.
Dynamic frequency selection	Master, 11h Slave
Cisco CCX	V2, V4

Sensors	
Accelerometer	Built-in 3-axis accelerometer, e.g. for detecting collisions, roll-overs or to monitor how a machine is driven.

Interfaces and connectors	
USB	1 x USB 2.0, for connection to CrossControl display or controller. DIN M12 5-pin A-coded female.
Power supply	C000138-30 and C000138-34: DIN M12 5-pin B-coded male, 12-24 Vdc, min. 10 W C000138-40: In the existing USB connector, 5 Vcd, min 10 W
Antenna connectors	
GNSS/GPS	RP-SMA female
Modem RX/TX main	RP-SMA female
Modem RX diversity	RP-SMA female
WLAN	Co-located in one RP-SMA female

Software	
Supported operating systems	Yocto based Linux (kernel 3.10+) Ubuntu based Linux (kernel 2.6+)
Application development	Applications developed for CrossControl displays either utilizing LinX Software Suite – an open software application platform based on Qt - or based on Linux operating system images provided with the display.

Environment and certifications	
IP class	IP67
EMC conformity	ETSI EN 301 489-1, -17 and -24

	EN 61000-6-2 and EN 61000-6-4 UN ECE regulation 10 EN 13309:2010, ISO 14982:2009
LVD conformity	IEC/EN 60950-1:2006 incl. A1, A2, A11, A12 IEC/EN 60950-22:2006, A11, C1, A11/C1 ANSI/UL 60950-1 CAN/CSA C22.2 No. 60950-1-07
Radio certifications	CE/FCC/ETL/CB. Certified for Europe and North America. Additional certification will be added gradually. Contact CrossControl for information on current certification status.
Temperature range	Operating: -25 to +70°C Storage: -40 to +85°C
Damp heat test cycle	+25°C to +55°C >95% RH 6*24h
Altitude	Operating 5000m Non-operating 10000m

Enclosure	
Housing material	Reinforced nylon
Mechanical installation	Either at rear side of display (back-pack) or stand-alone.

Size and weight	
W x H x D	145 x 96 x 39 mm
Wight	Approximately 0.4 kg

1.3. Identification

There is a label on the front of CrossLink AI. On the label there are numbers which identify your unique module. Take note of them. During service and other contact it is important to be able to provide these numbers.

1.4. Environmental tolerance

CrossLink AI has been designed to cope with tough environmental demands. Strict tests have been conducted on the unit in order to ensure that it fulfils the expectations of a rugged unit. Much work has been performed to choose and design integral components so that they, in the best possible way and under all circumstances, provide you with a dependable working instrument. In chapter 1.2 Technical data, a list of standards can be found according to which CrossLink AI has been tested and approved.

Despite thorough design requirements and testing specifications, it is always best to install and handle CrossLink AI with care. For more information, read further.

2. Installation

In this section, some recommendations are made regarding methods for how CrossLink AI should be installed.

2.1. Installation environment

CrossLink AI should be installed in such a way that the module is not exposed to any unnecessary environmental stress.

2.1.1. Cooling

Although CrossLink AI can operate in relatively high temperatures, cooling should still be considered when installing. If the unit becomes too warm, it may not perform to its full capacity and, with extremely high temperatures, cease to function.

Inadequate cooling may lead to overheating, causing permanent damage to the unit.

2.1.2. Vibration

We recommend installing CrossLink AI in such a way that it is not unnecessarily exposed to vibration or other stress.

2.1.3. Storage and shipping

Environment	
Temperature range	Storage: -40 to +85°C
Humidity	Storage: +70°C 80%RH
Altitude	Non-operating 10000m

2.2. Antennas

The following requirements for the antennas must be fulfilled

Antenna	Requirements
GPS/GNSS	Frequency range: 1565~1607 MHz Polarization: RHCP or linear VSWR: < 2 (Typ.) Passive antenna gain: > 0dBi Active antenna noise figure: < 1.5dB Active antenna gain: > -2dBi Active antenna embedded LNA gain: 20dB (Typ.) Active antenna total gain: > 18dBi (Typ.)
3G/GPRS (including diversity)	VSWR: ≤ 2 Gain (dBi): 1 Max Input Power (W): 50 Input Impedance (ohm): 50 Polarization Type: Vertical Cable Insertion Loss: < 1dB (GSM850/900, UMTS800/850/900) Cable Insertion Loss: < 1.5dB (GSM1800/1900, UMTS1900/2100)
WLAN	Frequency range: 2400~2483.5 MHz & 4900~5875 MHz VSWR: ≤ 2 Peak Gain (dBi): ~1.8 - 3 @ 2.4 GHz, ~4.6 - 4.9 @ 5 GHz Max Input Power W: 2 Input Impedance (ohm): 50 Polarization Type: Linear

Keep a distance of at least 20 cm between all antennas to improve RF performance.
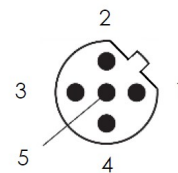
3. Electrical interface

3.1. Connectors

3.1.1. Power connector

The power supply connector X1, which exists only on part numbers C000138-30 and C000138-34, is a DIN M12 x 1 male 5-pole, B-coded connector.

Pin	Signal name	Comment
1	VIN	9-32V
2	VIN	9-32V
3	GND	Ground
4	GND	Ground
5	NC	Not connected

DIN M12 x 1 male,
5-pole, B-coded

3.1.2. USB connector

The USB connector X2 is a DIN M12 socket 5-pole, A-coded connector

Pin	Signal name	Comment
1	VBUS	5V from host
2	D-	USB differential pair -
3	D+	USB differential pair +
4	NC	Not connected
5	GND	Ground

DIN M12 x 1
female, 5-pole,
A-coded
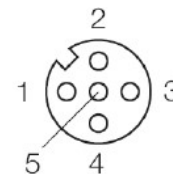
3.1.3. WLAN antenna connector

The WLAN antenna connector X3 is a RP-SMA female connector and has a green dot close to it for easier identification.

3.1.4. 3G/GPRS antenna connector

The 3G/GPRS antenna connector X4 is a RP-SMA female connector and has a yellow dot close to it for easier identification.

3.1.5. GPS/GNSS antenna connector

The GPS/GNSS antenna connector X5 is a RP-SMA female connector and has a blue dot close to it for easier identification. This connector is designed for supplying an active antenna.

3.1.6. Diversity antenna connector

The diversity antenna connector X6 is a RP-SMA female connector and has a red dot close to it for easier identification.
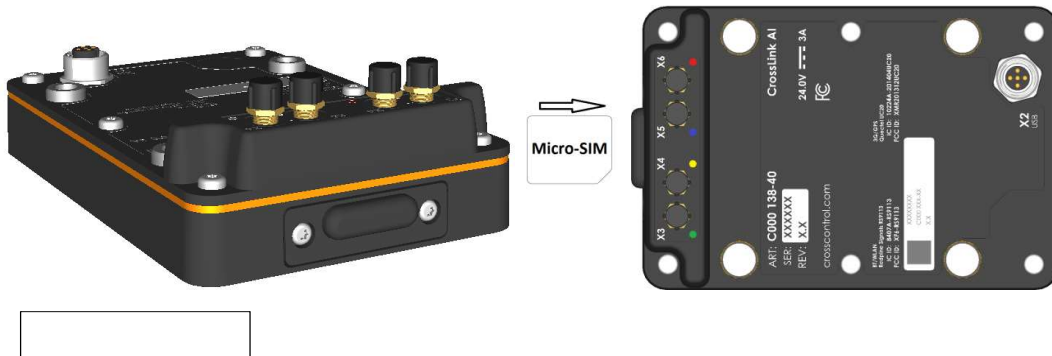
3.2. SIM-card holder

There is a hatch with two T10 torx screws, located below the antenna connectors that covers the micro SIM-card holder.

The max torque on the screws must not exceed 0.25Nm

The micro SIM-card shall be installed according to the picture below

4. Technical support

If the unit is opened by non-authorised personnel, the warranty becomes void. Contact your reseller or supplier for help with possible problems with CrossLink AI.

In order to receive the best possible support, you should have access to your CrossLink AI and be prepared with the following information before you contact support.

- Part number and serial number of the unit, which you find on the brand label
- Date of purchase, which is found on the invoice
- The conditions and circumstances under which the problem arises
- Description of external equipment connected to CrossLink AI