IOT-LINK

Reference Guide

Compulab

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Table 1 Revision Notes

Date	Description
June 2025	• Initial release
August 2025	• Added remove power CNTL description in section 3.8.4
September 2025	• Added typical power consumption in section 7.3

Please check for a newer revision of this manual at the Compulab website https://www.compulab.com. Compare the revision notes of the updated manual from the website with those of the printed or electronic version that you have.

1 INTRODUCTION

1.1 About This Document

This document is part of a set of reference documents providing information necessary to operate and program Compulab IOT-LINK product.

1.2 Related Documents

For additional information, refer to the documents listed in Table 2.

Table 2 Related Documents

Document	Location
IOT-LINK Resources	https://www.compulab.com/products/iot-gateways/iot-link-industrial-iot-gateway/#devres
i.MX93 Reference Manual	https://www.nxp.com/products/processors-and-microcontrollers/arm-processors/i-mx-applications-processors/i-mx-9-processors/i-mx-93-applications-processor-family-arm-cortex-a55-ml-acceleration-power-efficient-mpu:i.MX93
i.MX93 Datasheet	

2 OVERVIEW

2.1 Highlights

IOT-LINK is a miniature, highly integrated industrial IoT gateway optimized for low-cost applications.

- NXP i.MX93, dual-core Cortex-A53, 1.7GHz
- Up to 2GB LPDDR4 and 64GB eMMC
- Worldwide LTE modem, LAN and WiFi
- 2x RS485 / CAN-FD , 3x DI / DO
- Bluetooth mesh, Thread and Zigbee
- Wide temperature range of -40C to 80C
- Operating systems: Debian Linux, Yocto Project, Balena OS

2.2 Specifications

The "Option" column specifies the IOT-LINK configuration option required to have the particular feature.
"+" means that the feature is always available.

Table 3 Features and Configuration options

Feature	Description	Option
CPU, Memory and Storage		
CPU	NXP i.MX9352, dual-core ARM Cortex-A55, 1.7GHz	C1700D
Real-Time Co-processor	ARM Cortex-M33, 250Mhz	+
RAM	512MB – 2GB, LPDDR4	D
Storage	eMMC flash, 8GB - 64GB	N
Network		
Cellular Modem	4G/LTE CAT-1 bis cellular module, SIMCOM SIM7672 Worldwide LTE, UMTS/HSPA	JS7672G
	SIM card socket	+
WiFi and Bluetooth	802.11ax WiFi 6 and Bluetooth 5.4 BLE Implemented with NXP IW611 module 1x RP-SMA antenna connector	WB
Wireless Mesh	Bluetooth mesh, Thread, Zigbee Nordic Semiconductor nRF52840 / Silicon Labs MGM240	WMx
LAN	1x Gbit Ethernet, RJ45 connector	E
I/O		
RS485 CAN bus	Up-to 2x RS485 (2-wire) | CAN-FD ports Terminal-block connector	Fxx
Digital I/O	3x digital outputs / inputs 24V compliant with EN 61131-2, terminal-block connector	DIO
USB	1x USB2.0 host port, type-C connector	+
Debug	1x serial console via UART-to-USB bridge, micro-USB connector	+
	NXP SDP programming port, micro-USB connector	+
System		
RTC	Real-time clock, powered by external battery	+
Watchdog	Hardware watchdog	+
Security	Secure boot, implemented with i.MX93 AHAB module	+
	TPM 2.0, Infineon SLB9673	+
Indicators	1x programmable dual-color LED 1x power LED	+
POE	Support for PoE (powered device)	POE

Table 4 Electrical, Mechanical and Environmental Specifications

Electrical Specifications	
Power Supply	12V-24V DC (-20%/+20%) Reverse voltage protection
Power consumption	1W - 5W, depending on system load and configuration
Mechanical Specifications	
Dimensions (H x W x D)	83 x 28 x 55 mm
Weight	170 gram
Housing material	Aluminum

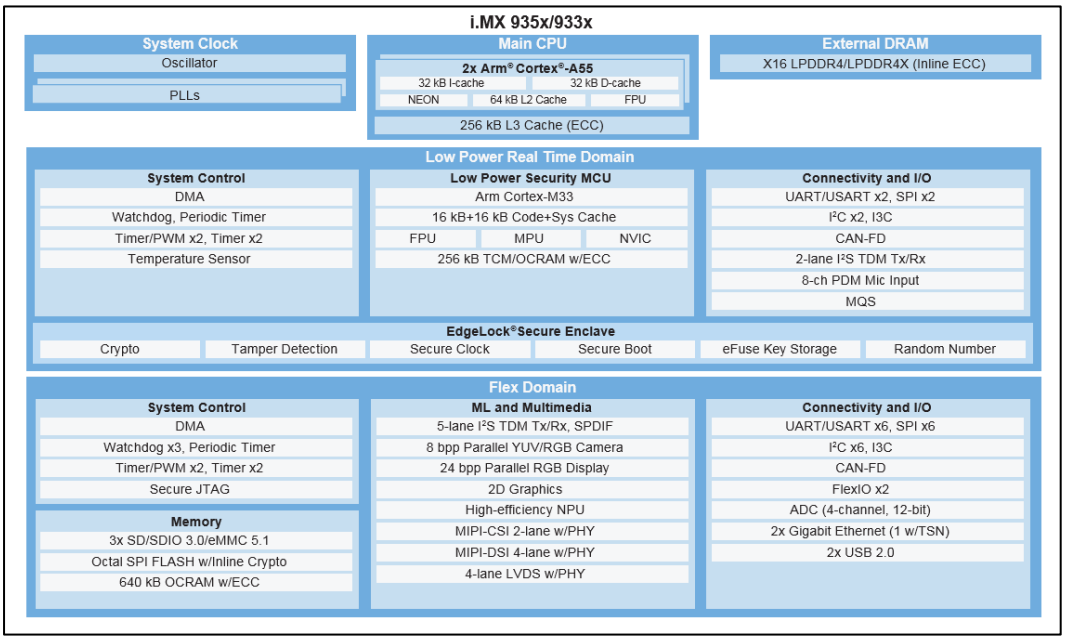
Cooling	Passive cooling, fanless design
Reliability and Environmental	
MTTF	> 200,000 hours
Warranty	5 years
Operation temperature (case)	Commercial: 0° to 60° C
	Industrial: -40° to 80° C
Storage temperature	-40° to 85° C
Relative humidity	10% to 90% (operation)
	05% to 95% (storage)

3 CORE SYSTEM COMPONENTS

3.1 i.MX93 System-on-Chip

The i.MX 93 System-on-Chip (SoC) includes powerful dual Arm® Cortex®-A55 processors with speeds up to 1.7 GHz. A general-purpose Arm® Cortex®-M33 running up to 250 MHz is for real-time and low-power processing.

Figure 1 i.MX 93 Block Diagram



3.2 Memory

3.2.1 DRAM

IOT-LINK is available with up to 2GB of onboard LPDDR4 memory.

3.2.2 Storage

IOT-LINK uses on-board non-volatile memory (eMMC) storage for storing the bootloader. The remaining eMMC space is intended to store the operating system (kernel & root filesystem) and general purpose (user) data.

3.3 Cellular

IOT-LINK can be optionally assembled a mini-PCIe cellular modem module. To set up IOT-LINK for cellular functionality, install an active SIM card into SIM socket located behind the back panel. Remove the back panel to access the SIM socket.

Modem antenna connection is available via SMA connector on the IOT-LINK front panel.

Note: Cellular modem is present only in gateways ordered with the “Jxx” configuration option

3.4 WiFi and Wireless Mesh Modules

IOT-LINK can be optionally assembled with one of the following wireless communication modules:

- 802.11ax WiFi 6 and Bluetooth 5.4 module based on NXP IW611 ("**WB**" option)
- Wireless mesh module based on Nordic Semiconductor nRF52840 ("**WMN**" option)
- Wireless mesh module based on Silicon Labs MGM240 ("**WMS**" option)

The antenna connection of the installed module is available via RP-SMA connector on the IOT-LINK front panel.

WiFi / Bluetooth module is interfaced with the i.MX93 SoC via SDIO and UART ports.

Wireless mesh modules are interfaced with the i.MX93 SoC via USB interface multiplexed with the USB host connector.

Note: When IOT-LINK is assembled with a wireless mesh module, USB host connector is inactive and cannot be used

3.5 Ethernet

IOT-LINK incorporates one Gigabit Ethernet port implemented with i.MX93 internal MAC and Realtek RTL8211 PHY.

3.6 Serial Debug Console

IOT-LINK features a serial debug console via a UART-to-USB bridge over micro USB connector. CP2104 UART-to-USB bridge is interfaced with i.MX93 UART port. CP2104 USB signals are routed to micro USB connector on the front panel, labeled DBG.

3.7 USB Programming Port

IOT-LINK features a USB SDP programming interface that can be used for device recovery using the NXP UUU utility.
USB programming interface is routed to the micro USB port located behind the back panel. Remove the back panel to access the USB SDP connector.
When a host PC is connected with a USB cable to the USB programming connector, IOT-LINK disables normal boot from eMMC and enters Serial Downloader boot mode.

3.8 Industrial I/O Terminal Block

IOT-LINK features a 10-pin terminal block containing several I/O interfaces.

For connector pin-out please refer to section 5.4.

3.8.1 CAN Bus

IOT-LINK features up-to two optional CAN-FD ports implemented with i.MX93 CAN controller.

Key characteristics:

- Full implementation of the CAN FD protocol and CAN protocol specification version 2.0B
- Compliant with the ISO 11898-1 standard
- Optional 120Ω termination resistors controlled by jumpers located behind the back panel

Note: CAN bus ports are only present in gateways ordered with the "FACAN" or "FBCAN" ordering options. CAN ports are mutually exclusive with RS485 ports

3.8.2 RS485

IOT-LINK features up-to two optional RS485 ports implemented with MAX13488 transceivers interfaced with i.MX93 UART ports. Key characteristics:

- 2-wire, half-duplex
- Programmable baud rate of up to 3Mbps
- Optional 120Ω termination resistors controlled by jumpers located behind the back panel

Note: RS485 ports are only present in gateways ordered with the "FARS4" or "FBRS4" ordering options. RA485 ports are mutually exclusive with CAN bus ports

3.8.3 Digital inputs and outputs

IOT-LINK provides three signals which can be used as either digital inputs or outputs. Key characteristics:

- Designed for 24V PLC applications
- Digital outputs maximal output current – 1A per channel
- Digital inputs self-powered with current limit

Table 5 Digital I/O Characteristics

Parameter	Description	Min	Typ.	Max	Unit
VDC	External power supply voltage	6	24	30	V
VIN_{TLH}	Low to High input voltage		9.4	11	V
VIN_{THL}	High to Low input voltage	5	7.5		V
VIN_{HYST}	Input trigger hysteresis	1.2		2.6	V
IOUT	Maximum output current per channel			1	A

3.8.4 Remote Power CNTL Input

A remote power button can be connected to the CNTL pin on the terminal block. Pressing the button changes the power state of the system. Connect the button between the CNTL pin and common ground pin.

Table 6 Power Button Control

Current State	Press	Resulting State
ON	Short	OFF (O/S controlled shutdown)
ON	Long	OFF (forced hardware shutdown)
OFF	Short	ON

Warning: Connecting the Remote Power Button input to DC voltage may damage the device. * Only connect the input pin to GND via contact switch *****

4 SYSTEM LOGIC

4.1 Power Subsystem

4.1.1 Power Rails

IOT-LINK is powered from a single power rail through the DC power connector.

4.1.2 Power Modes

IOT-LINK supports three hardware power modes.

Table 7 Power modes

Power Mode	Description
ON	All internal power rails are enabled. Mode entered automatically when the main power supply is connected.
OFF	CPU core power rails are off. All peripheral power rails are off.
Sleep	DRAM is maintained in self-refresh. Most CPU core power rails are off. Most of the peripheral power rails are off.

4.1.3 RTC Back-Up Battery

IOT-LINK features a 120mAh coin cell lithium battery, which maintains the on-board RTC whenever the main power supply is not present.

4.2 Real-Time Clock

IOT-LINK RTC is implemented with the AM1805 real-time clock (RTC) chip. IOT-LINK back-up battery keeps the RTC running to maintain clock and time information whenever the main power supply is not present.

4.3 Hardware Watchdog

IOT-LINK watchdog function is implemented with the i.MX93 watchdog.

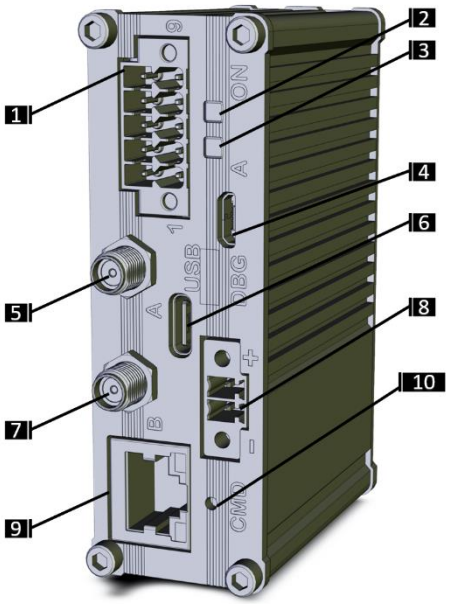
4.4 Trusted Platform Module

IOT-LINK is assembled with an Infineon SLB 9673 TPM2.0 compatible device.

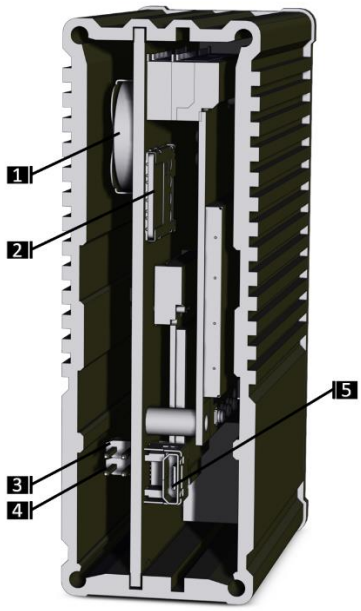
5 INTERFACES AND CONNECTORS

5.1 Connector Locations

5.1.1 Front Panel

Item	Description	
1	Industrial I/O terminal block, 10 pin, 16-26 AWG	
2	System status indicator. Dual-color blue/amber LED	
3	User programmable LED A	
4	Console connector, micro-USB type	
5	Antenna connector A	
6	USB connector	
7	Antenna connector B	
8	DC power input connector	
9	Ethernet port, dual RJ45 connector	
10	User programmable recessed push-button	

5.1.2 Back Panel (open)

Item	Description	
1	RTC battery holder	
2	SIM card socket	
3,4	RS485 / CAN bus termination jumpers	
5	SDP programming port, micro-USB type	
	NOTE: remove the back panel cover to access the connectors specified above	

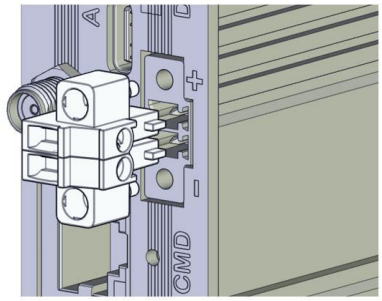
5.2 DC Power Connector

DC power input connector.

Table 8 Power connector pin-out

Pin	Signal Name	Description
1	+V	V+ DC pin
2	V-	V0 DC pin

Table 9 Power connector data

Connector type	Pin numbering
2-pin dual-raw plug with screw terminal connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: JL15EDGVM-35004G0[1|2] Mating connector P/N: JiNL JL15EDGKM-35004G01 NOTE: Compulab supplies the mating connector with the gateway unit	

5.3 USB Host Connector

IOT-LINK USB2.0 host port is available through standard type-C USB connector.

USB2.0 port is multiplexed with wireless mesh modules.

Note: IOT-LINK USB port does not provide USB3.0 functionality

Note: When IOT-LINK is assembled with a wireless mesh module, USB host connector is inactive and cannot be used

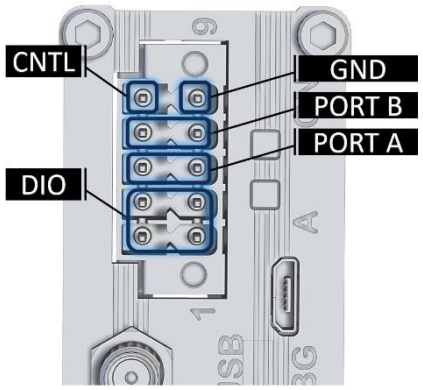
5.4 Industrial I/O Connector

IOT-LINK industrial I/O signals are routed to terminal block. Connector pin-out is shown below. For additional details please refer to section 3.8.

Table 10 Industrial I/O add-on connector pin-out

Pin	Signal Name	Description
1	DIO_VIN	Digital I/O external DC power input
2	DIO1	Digital input / output 1
3	DIO2	Digital input / output 2
4	DIO3	Digital input / output 3
5	PORTA_POS	PORT-A: RS485 positive / CAN high
6	PORTA_NEG	PORT-A: RS485 negative / CAN low
7	PORTB_POS	PORT-B: RS485 positive / CAN high
8	PORTB_NEG	PORT-B: RS485 negative / CAN low
9	GND	Common ground
10	CNTL	Programmable power control

Table 11 Industrial I/O add-on connector data

Connector type	Pin numbering
10-pin dual-raw plug with push-in spring connections Locking: screw flange Pitch: 3.5 mm Wire cross-section: AWG 16 – AWG 26 Connector P/N: JiLN JL15EDGRHCM-35005B01 Mating connector P/N: JiLN JL15EDGKNHM-35016B01 * Connector is compatible with Phoenix Contacts “MC 1.5/ 3.5mm“ terminal block series NOTE: Compulab supplies the mating connector with the gateway unit	

5.5 Serial Debug Console

IOT-LINK serial debug console interface is routed to micro-USB connector located on the front panel.

5.6 RJ45 Ethernet Connector

IOT-LINK features one Ethernet port, routed to RJ45 connector.

5.7 SIM card socket

IOT-LINK micro-SIM card socket is located on the back of the device.

Remove the back panel to access the SIM socket.

5.8 Indicator LEDs

The tables below describe IOT-LINK indicator LEDs.

Table 12 System Status LED

LED State	Gateway Status
OFF	System is in OFF or deep-sleep state
Solid BLUE	System is running U-boot bootloader
Solid AMBER	U-boot bootloader is not running. Indicates bootloader corruption
Blinking BLUE	System is running Linux O/S. Normal operation mode

General purpose LEDs are active high and controlled by SoC GPIOs.

5.9 Antenna Connectors

IOT-LINK features two connectors for external antennas.

Table 13 Default antenna connector assignment

Connector Name	Function	Connector Type
A	LTE main antenna	SMA
B	WiFi / Mesh antenna	RP-SMA

5.10 RS485 / CAN Termination Control

IOT-LINK features two termination resistors for RS485 / CAN bus ports. The terminations are independently controlled by two jumpers located on the IOT-LINK back panel.

Remove the pack panel cover to access the termination jumpers.

Note: IOT-LINK is preassembled with the termination jumpers. By default, the termination resistors are enabled for both ports

6 MECHANICAL DRAWINGS

IOT-LINK 3D model is available for download at:

https://www.compulab.com/products/iot-gateways/iot-link-industrial-iot-gateway/#devres

7 OPERATIONAL CHARACTERISTICS

7.1 Absolute Maximum Ratings

Table 14 Absolute Maximum ratings

Parameter	Min	Max	Unit
Main power supply voltage	-0.3	32	V

NOTE: Stress beyond Absolute Maximum Ratings may cause permanent damage to the device

7.2 Recommended Operating Conditions

Table 15 Recommended Operating Conditions

Parameter	Min	Typ.	Max	Unit
Main power supply voltage	9.6	12-24	28.8	V

7.3 Typical Power Consumption

Table 16 IOT-LINK Typical Power Consumption

Use case	Use case description	Current	Power
Linux idle	Linux up, Ethernet up, no activity	0.11A	1.32W
Wi-Fi or Ethernet data transfer	Linux up, active ethernet or Wi-Fi data transmission	0.16A	1.92W
Cellular modem data upload	Linux up, active modem data transmission	0.31A	3.72W
CPU stress-test	CPU and memory stress-test	0.14A	1.68W
Heavy mixed load with active cellular modem data transfer	CPU and memory stress-test + active modem data transmission	0.39A	4.68W

Power consumption has been measured with the following setup:

1. Configuration - IOT-LINK-D2-N32-E-WB-JS7672G-FARS4-FBCAN-DIO-POE-XL
2. 12VDC PSU

Software stack - IOT-LINK stock Debian image ver1.1