

T715-v4 Changelog and Installation Guide

Confidential

Document Revision History

V0.1: First released version. Published on 02/05/2025.

V0.2: Updated based on button adding on 03/07/2025.

Confidential

This document explains how to use the first prototypes(revA) of T715 v4 and the parts that have changed compared to v2.1 in production recently.

CHANGELOG

Removed Features

- USB-A connector on the panel
- SIM card connector on the panel
- USB hub and its requirements.(voltage regulators, resistors etc.)
- Boot/burn slide switch

Added Features

- 2 RGB LEDs on the panel
- Supercapacitor backup and voltage level measurement of the supercapacitor
- Power loss detection
- CM4 pinout has not changed significantly but RGB LEDs and supercap readings added to IOs. See the pinout table for details.
- Boot/burn Female header jumper

Changed Features

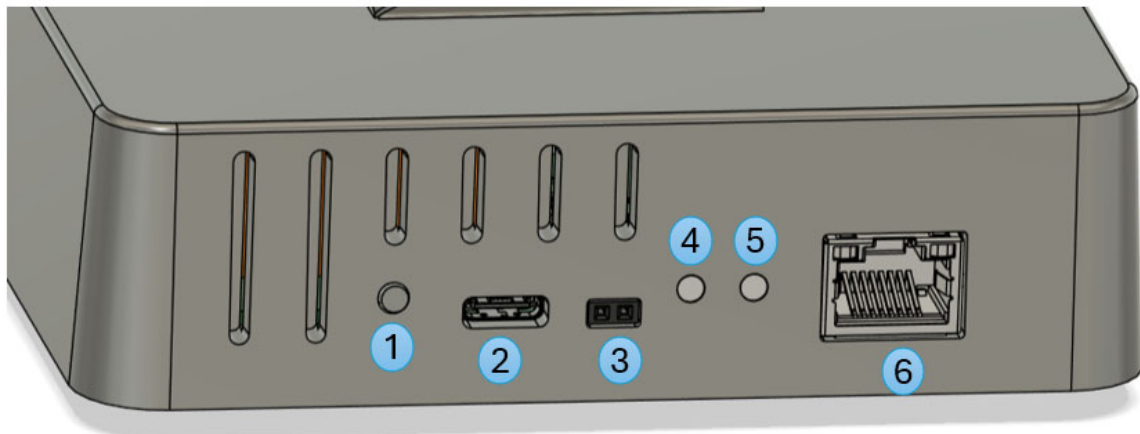
- Image upload port on the panel
- In the new enclosure design, the size has been reduced by 32%.
- Added a wall mount with a hanging feature.
- An enclosure was specially designed for injection molding custom to Acorn Stairlifts.

USER GUIDE

Product Overview

The T715 v4 is an industrial IoT edge Controller designed for remote monitoring and control applications.

The device is intended to operate as an industrial IoT controller/edge Controller . It acquires, processes and transfers application data to cloud or enterprise services.



1. User Button

It is a push button with a pull-up circuit. The button can be programmed by the user, and there is no design change compared to v2.1.

2. Type-C Port

It is used for both power and image upload.

3. Image Upload Mode Port

To switch to image upload mode, the header must be installed as seen in the picture below while the supercapacitors are empty and the device is completely off.



Since there is a supercapacitor in the circuit, it is necessary to wait for a while when it is plugged into the computer in image upload mode.

Since the supercapacitors are charged while the image is being uploaded, it is necessary to wait for the capacitors to discharge after the image upload is complete.

This waiting period should be at least **15 minutes**. Afterwards, the header will be removed and the device will return to normal operating mode.

4. RGB2

It is controlled by GPIO25(RED), GPIO26(GREEN), GPIO27(BLUE). When the pin is LOW, the LED is lit, when it is HIGH, the LED is off.

5. RGB1

It is controlled by GPIO20(RED), GPIO21(GREEN), GPIO22(BLUE). When the pin is LOW, the LED is on, when it is HIGH, the LED is off.

6. Gigabit Ethernet

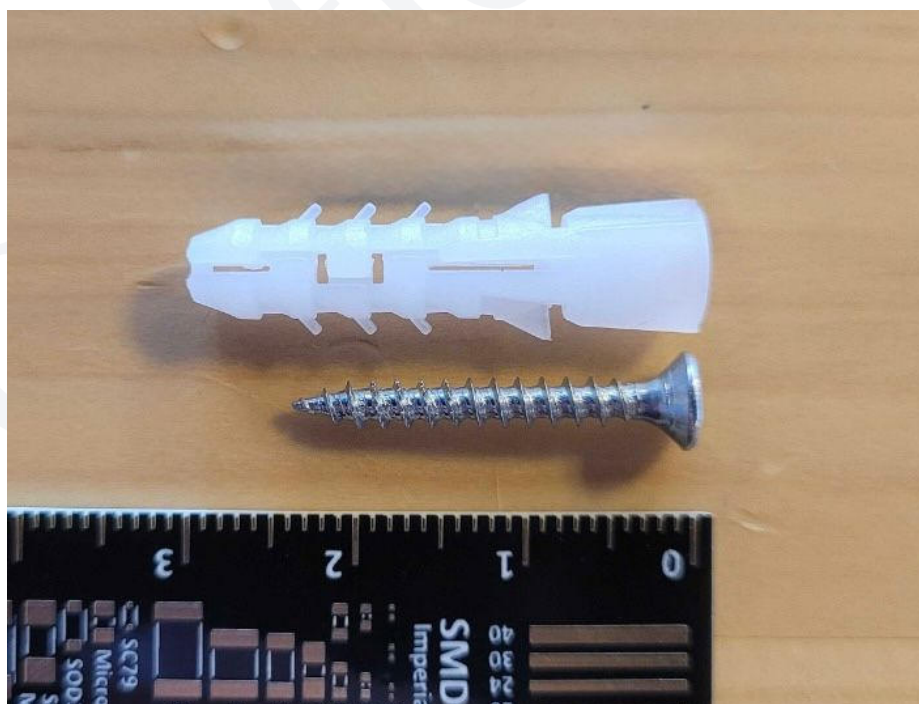
The Ethernet port is connected to CM4 Ethernet pins. It supports 1000 Mbits speed.

WALL MOUNT

The wall mounting bracket comes with the box. The part in the picture below is mounted to the box with 2 screws included in the package.



The other part is mounted on any wall. For mounting, the M3 x 25 mm phillips flat head screw and 5mm dowel provided in the box must be used. Then the T715 v4 is attached to the wall mount as in the picture.





SUPERCAPACITOR BACKUP

The biggest difference with the previous version is the addition of a supercapacitor circuit. In this way, the device can work for a certain period of time in the event of a power outage. Supercap backup time varies depending on the operations performed.

POWER LOSS DETECT

Thanks to this circuit, power outages will also be detected. PFO pin is connected to LTC4041, this pin is normally HIGH. It reads LOW when Type-C power is interrupted.

When there is a power outage, the supercapacitors are activated and if the supercap voltage drops below 1.1V, the CM4 and LTE modules are shut down.

SUPERCAPACITOR VOLTAGE MEASUREMENT

In addition, the supercapacitor voltage can be measured with the help of an ADC. The value read from TLA2021IRUGT should be multiplied by x2.7 since it is a voltage divider.

1. Open the config.txt file for editing.

```
sudo nano /boot/firmware/config.txt
```

2. Add the following line at the end of the file to enable I2C-1.

```
dtoverlay=i2c-arms
```

3. Save and exit by pressing Ctrl + O, then Enter, and Ctrl + X.
4. Reboot the system for the changes to take effect:

```
sudo reboot
```

5. Run the following command to list all devices connected to I2C-1.

```
sudo i2cdetect -y 1
```

6. Check for address 0x48 in the output. If you see 48 listed, that means the device at address 0x48 is successfully detected on I2C-1.

```
    0 1 2 3 4 5 6 7 8 9 a b c d e f
00:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
10:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
20:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
30:  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --  --
40:  --  --  --  --  --  --  --  --  --  --  48  --  --  --  --  --  --
...
```

7. Install python3-venv if it's not already installed.

```
sudo apt update
sudo apt install -y python3-venv
```

8. Create a new virtual environment.

```
python3 -m venv myenv
```

9. Activate the virtual environment.

```
source myenv/bin/activate
```

10. Install the smbus2 library.

```
pip install smbus2
```

11. Once the code is ready, run it to start measuring the voltage in real time.


```
import smbus2
import time

bus = smbus2.SMBus(1)
address = 0x48
config = [0xC2, 0x03] # AIN0-GND, ±4.096V, 12-bit, continuous mode
bus.write_i2c_block_data(address, 0x01, config)
time.sleep(0.1)

def read_voltage():
    data = bus.read_i2c_block_data(address, 0x00, 2)
    raw = ((data[0] << 8) | data[1]) >> 4
    return (raw * 4.096) / 4095

try:
    while True:
        v = read_voltage() * 2.7 # Voltage divider: 320kΩ/120kΩ
        print(f"Voltage: {v:.3f} V")
        time.sleep(1)
except KeyboardInterrupt:
    bus.close()
    print("Measurement stopped")
```

USER BUTTON

It is a pull-up button. If the button is pressed, LOW should be read from GPIO24.

PINOUT

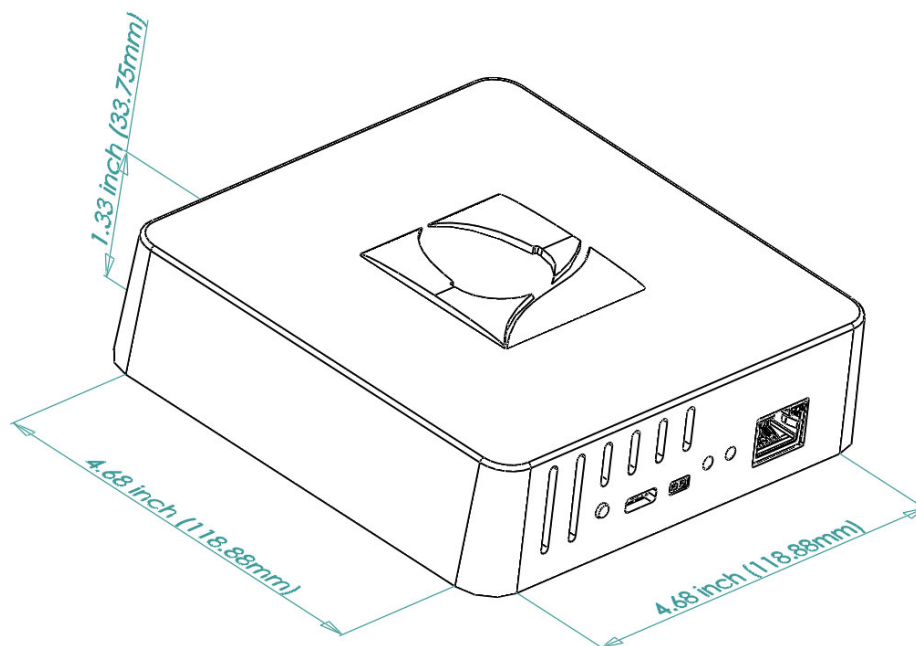
LED usage and sequencing are detailed. The LTE_PWR_OFF function still relies on GPIO18. The following table outlines the CM4 pinout, functions, and notes, covering GPIOs related to I2C, CAPGD, PFO, LTE_PWR, and RGB LEDs.

CM4 Pinout	Function	Note
GPIO2	I2C1-SDA	Connected to TLA2021IRUGT. IC i2c Address: 0x48.
GPIO3	I2C1-SCL	Connected to TLA2021IRUGT. IC i2c Address: 0x48.
GPIO5	PFO	Connected to LTC4041, this pin is normally HIGH. It reads LOW when Type-C power is interrupted.
GPIO18	LTE_PWR_OFF	The LTE 3.3V regulator's enable pin (EN) is connected to this pin. The LTE Module's power can be turned off completely when the CM4 GPIO18 is set to HIGH.

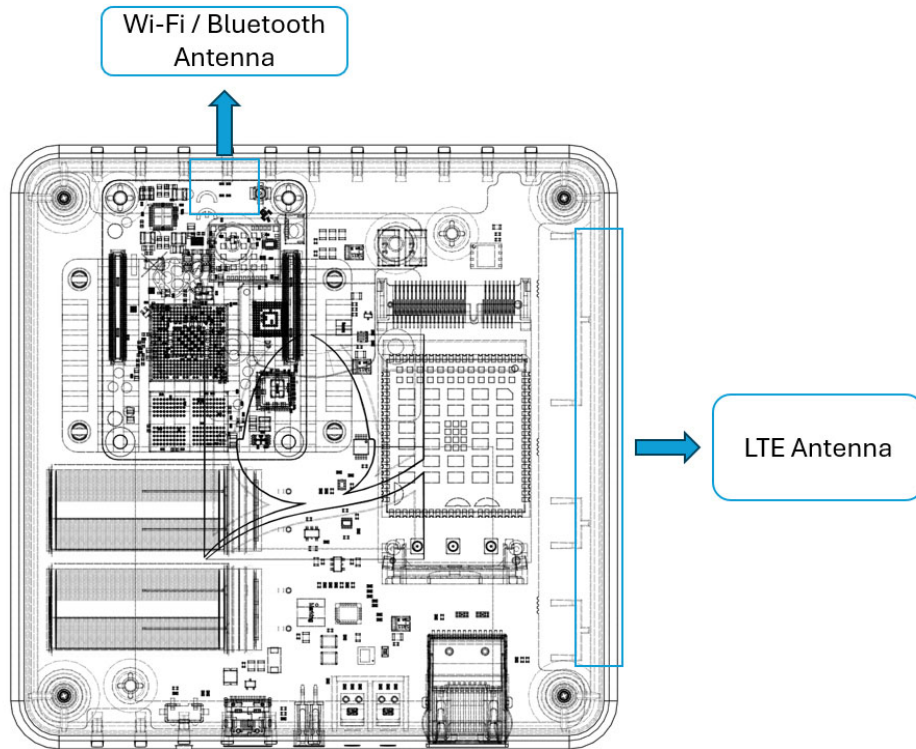
		GPIO18 should be set to LOW in normal state
GPIO20	RGB1-RED	The connection is established with the red pin of LD1.
GPIO21	RGB1-GREEN	The connection is established with the green pin of LD1.
GPIO22	RGB1-BLUE	The connection is established with the blue pin of LD1.
GPIO24	USER-BUTTON	User button normally HIGH and goes LOW when pressed.
GPIO25	RGB2-RED	The connection is established with the red pin of LD2.
GPIO26	RGB2-GREEN	The connection is established with the green pin of LD2.
GPIO27	RGB2-BLUE	The connection is established with the blue pin of LD2.

MECHANICAL

The dimensions are 4.68 x 4.68 x 1.33 inches (118.88 x 118.88 x 33.75 mm) as shown below.



Device Orientation



1. Minimum User Distance: Maintain at least 20 cm (8 inches) of separation between the device and users to comply with RF exposure regulations (e.g., FCC, CE).
2. Installation Environment: The device should not be enclosed in metal housings or near metallic surfaces that could block or reflect RF signals.
3. Distance from Obstructions:
 - Install the device with at least 10 cm (4 inches) clearance from nearby walls, especially metallic or reflective surfaces, to minimize signal attenuation and reflection.
 - Keep at least 20 cm (8 inches) of separation between the antennas and large metal objects such as enclosures, power supplies, or heat sinks.
4. Avoiding Interference & Separation from LTE Devices: Maintain a minimum distance of 50 cm (20 inches) between this device and any other active LTE or cellular RF devices to avoid mutual interference and performance degradation.

FCC Statement

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 interference that may cause undesired operation.

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 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

ISED Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L'appareil ne doit pas produire de brouillage;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Statement

This equipment complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux radiations FCC/ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

The device is restricted to indoor use only when operating in the 5150 to 5250MHz frequency range.

L'appareil est limité à une utilisation en intérieur uniquement lorsqu'il fonctionne dans la plage de fréquences de 5 150 à 5 250 MHz.