



T23NAM Redesign

User Manual (STRLNK3P)

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1 Introduction

The Data Communication Module(DCM) integrates an on-board cellular communication module with a WiFi hotspot functionality and interacts with remote call/data centers to provide valuable services to the vehicle customer.

1.1 Purpose and Scope

This document aims to describe the device operating principles and provide installation instruction to OEM to insure safe use of the device.

1.2 Product Description

Subaru T23NAM Redesign is a proprietary DCM designed and manufactured by Continental Automotive. The DCM includes an integrated Network Access Device (NAD) that is also designed and produced by Continental.

The DCM will be installed as a vehicle mounted wireless devices into Subaru vehicles during the OEM's factory assembly process and will not be accessible without use of special tools.

The DCM functionalities are accomplished by 2G/3G/4G technologies (Voice & Data) and defined service feature.

The DCM comprises of the following subsystem components:

- Power supply
- Vehicle micro-controller (VuC)
- Network Access Device (NAD)
- Vehicle interface / communications
- Battery

1.3 Power and Grounding

The DCM is designed to operate via an unfiltered 5 A fused input from the vehicle battery: Vbatt

Ground return is through a single ground pin: GND

1.3.1 Power and Grounding

Operating voltage range is provided in the following table.

Table 3.1.1 DCM Operating Voltage Conditions

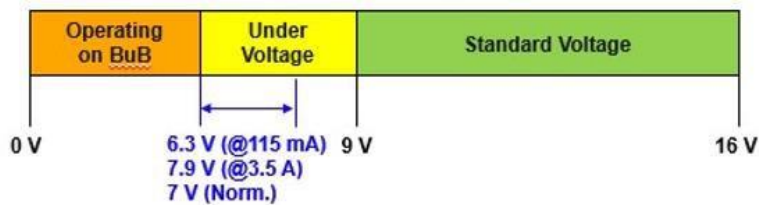
Voltage Range (Vdc)	Subsystem Operating Conditions
$9.0 < V_{BATT} < 16.0$	Normal operation. TCU is fully functional

The VBATT connection (pin 17) shall support up to 2.5A current draw with 4.5A peaks. Vehicle wire gauge must be chosen to support this current load with less than 0.5V drop between battery terminal and this pin.

1.3.1.1 VBatt values out of normal range

The threshold voltage transition from Vehicle Battery to Backup Battery:

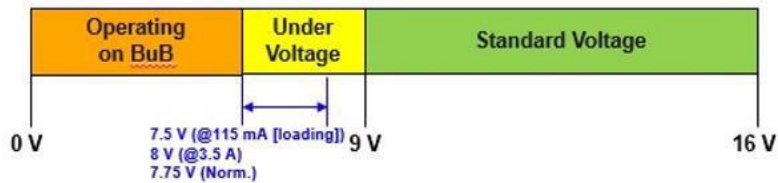
If the VBATT voltage transitions downward from $>8.6V$ to $<7.3V$ and BUB voltage is $>2.0V$, the DCM shall begin using the BUB as a power source (i.e. switch to BUB), or, if no BUB is present, become UNPOWERED.





The threshold voltage transition from Backup Battery to Vehicle Battery:

If the VBATT voltage transitions upward from $<7.7\text{V}$ to $>9.0\text{V}$ AND BUB voltage $> 2.0\text{V}$, the DCM shall begin using the VBATT as a power source (i.e. switch to +B). The DCM shall continue to be OPERATING ON VBATT until the conditions of DCM_02552 or DCM_00031 are met.



1.3.2 Backup Battery (BUB)

BUB refers to the Back-up Battery installed in the DCM; the DCM is shipped to Subaru with a BUB installed. This battery can be used to power the DCM if the main vehicle battery is lost.

The BUB has no effect on DCM feature operation when DCM is running on MAIN BATTERY, i.e. when MAIN BATTERY is at least 7V.

The BUB used on the DCM has the following characteristics

Technology: LiFePO₄ (Lithium-Iron)

Rated Capacity: 1100mAh

Nominal Voltage: 3.2V

Temperature: Charge 0 to 45C, Discharge -30 to 60C.

Charging Voltage (Max): 3.81V

Minimum End of Discharge Voltage: 2.0V

Protection Circuit Required : No

1.3.3 DCM Interface to External LTE/WCDMA/GSM Antennas

The DCM has FAKRA connectors to which external LTE/GSM antennas may be connected.

1.3.4 DCM Interface External Fault Detection

For vehicles that are configured to use External LTE/GSM Antennas, the DCM has the capability to determine if the External Antenna is connected and to log a fault if it determines that the External Antenna is not connected (circuit open fault). It is also preferred that the DCM detect and log if the External Antenna is shorted to ground.

1.4 WiFi

The DCM supports IEEE 802.11a/b/g/n/ac 2.4/5GHz WiFi.

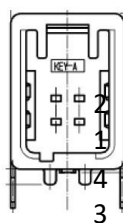
1.4.1 WiFi internal Antenna

The DCM contains integrated pcb type F dual band antenna with the following maximum gain

Frequency	MAX Gain
2442 MHz	3.14 dBi
5220 MHz	0.68 dBi
5785 MHz	1.94 dBi

1.5 Connectors

1.5.1 USB Connector

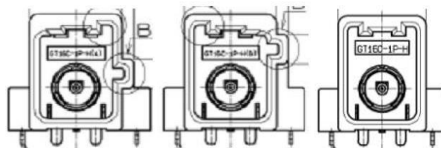


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*USB Connector – pin details
(View from mating
side)*

Pin No.	Terminal Name	Terminal Description	Input(I) / Output(O)
USB – pin 1	USB+	USB D+	I/O
USB – pin 2	USBS	USB Shield GND	GND
USB – pin 3	USBVCC	USB +5V Supply	PS
USB – pin 4	USB-	USB D-	I/O

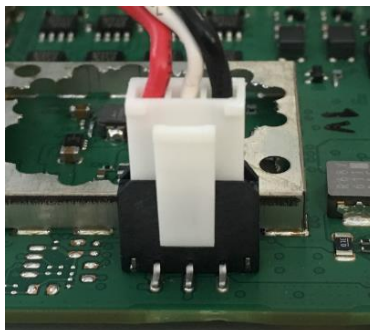
1.5.2 RF Connector



*RF Connector – pin details
(View from mating side)*

Terminal Name	Terminal Description	Input(I) / Output(O)
Primary	TEL MAIN antenna signal	I
	TEL MAIN antenna GND	GND
Secondary	TEL SUB antenna signal	I
	TEL SUB antenna GND	GND
GPS	GNSS antenna signal	I
	GNSS antenna GND	GND

1.5.3 BUB Connector

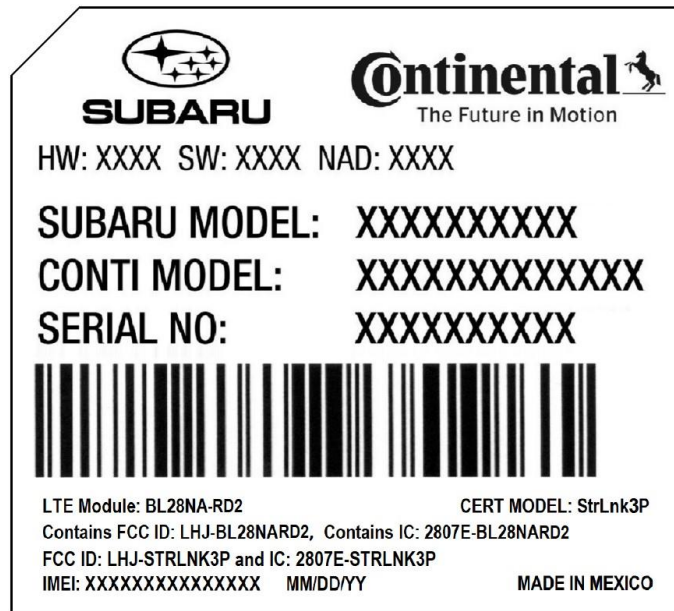


CONNECTOR	Pin Number	Signal Name
BUB connector Molex 43650-0323	1	VBUB
	2	BUB NTC
	3	GND
	M1	Not Connected
	M2	Not Connected



1.6 DCM Module Label

The DCM labeling shall comply with the regulatory homologation compliance mark(s) that are required by law in those countries. Artwork for Subaru T23NAM Redesign is shown below:



The module is marked with the Automotive OEM company trademark, engineering part number, and supplier code.

1.7 DCM Antenna Transmit Area

For DCM variants that utilize an internal antenna, the module housing shall not be made of a metal, nor contain a metal coating, that inhibits the transmission, or reception, of cellular signals in the areas specified in the diagrams below.

Wi-Fi Antenna

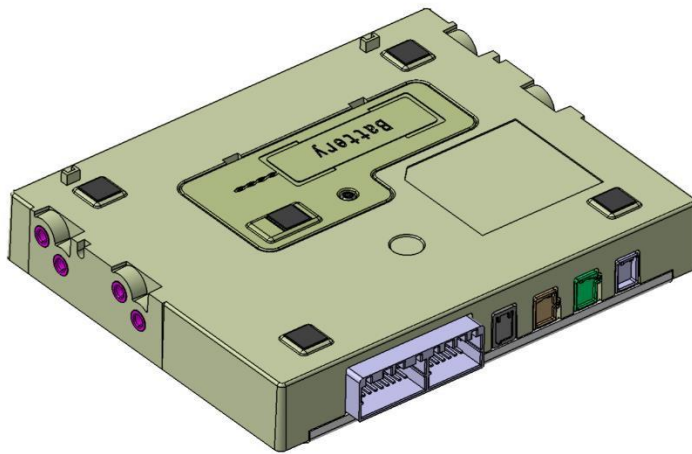
The DCM is designed to allow the Wi-Fi antenna signal to propagate out of the top, bottom, and sides of the module.



2 Vehicle Installation Guidelines

Normal operating conditions are between -30°C to +85°C.

The sheet metal cover is designed to be a heat sink. A gap between the heat sink and the mounting surface is recommended to facilitate heat transfer out of the module. Exceptions can be made if the module is mounted to a surface that can help facilitate heat transfer such as a large aluminum body panel.



The device does not have sealed connectors.

It is designed to meet Class I water intrusion conditions (no drip test required), so it should not be placed in area that can get wet.

Continental recommends that the automotive OEM uses the mating harness supplier's recommendations for the keep out zone around the connectors to ensure proper mating of each connector.

Changes or modifications to this system by other than a facility authorized by Continental could void authorization to use this equipment.

The device and its antennas must be installed to provide a separation distance of at least 25 cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter.



3 Regulatory Compliance Notes

FCC: This device complies with Part 15, Part 22(H), Part 24(E) and Part 27 of the FCC Rules. The FCC ID for this device is LHJ-STRLNK3P. It also contains a certified module with FCC ID: LHJ-BL28NARD2.

15.19

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 of the device.

15.105

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.

15.21

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

**Industry of Canada:**

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

- (1) This device may not cause interference; and
- (2) This device must accept any interference, including interference that may cause undesired operation of the device."

« Le présent appareil est conforme aux CNR d'Industrie 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, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. »

Caution: Exposure to Radio Frequency Radiation

- 1. To comply with the Canadian RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.
- 2. To comply with RSS 102 RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

Attention: exposition au rayonnement radiofréquence

- 1. Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.
- 2. Pour se conformer aux exigences de conformité CNR 102 RF exposition, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.



4 External Antenna Requirements for use with T23NAM Redesign

The T23NAM Redesign DCM is for use with external antennas ONLY, except for Wi-Fi which uses an internal antenna.

For all LTE/WCDMA operating bands the maximum antenna gain including cable loss shall not exceed the following values:

GSM 850: 1 dBi
GSM 1900: 2 dBi
WCDMA Band 2: 2 dBi
WCDMA Band 4: 2 dBi
WCDMA Band 5: 1 dBi
LTE Band 2: 2 dBi
LTE Band 4: 2 dBi
LTE Band 5: 1 dBi
LTE Band 7: 2 dBi
LTE Band 12: 2 dBi

5 Instructions to OEMS

Continental must instruct the automotive OEM and provide them to include the following information into the car user's manual (i.e. for the DCM):

1. End-users must be provided with transmitter/antenna installation requirements and operating conditions for satisfying RF exposure compliance:
2. A separate section should clearly state "FCC RF Exposure requirements:"
3. Required operating conditions for end users.
4. The antenna used with this device must be installed to provide a separation distance of at least 25cm from all persons, and must not transmit simultaneously with any other transmitter, except in accordance with FCC multi-transmitter product procedures.
5. The Maximum ERP/EIRP and maximum antenna gain required for compliance with Parts 15, 22H, 24E, and 27.
6. Clear instructions describing the other party's responsibility to obtain station licensing.