DASAN Networks

TGU / RC-TGU

(Telemetric Gate Unit) / (Remote Control Telemetric Gate Unit)

Installation Manual

version 1.3

This manual describes how to install the product. Read carefully this manual before using this product and install the product according to guideline. And after reading this manual, keep it well and, if the person in charge is changed, be sure to hand over this manual to the successor and let he/she use the product correctly.

The content and image in this manual can be changed without notice by reason of product's function improvement or etc.

Issued by
DASAN Networks

Revision history of document

Version	Date	Description
V1.0	2023-12-05	Initial release
V1.1	2024-12-10	Second release
V1.2	2024-12-19	Third release
V1.3	2024-12-20	Add IC warning statement

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1. Precautions in Product Handling

Read carefully the following contents before handling this product and use this product correctly according to guidelines. And after understanding precautions well, keep this manual well and let manager or user use this manual before and after installing product or before handling product. If the person in charge is changed, be sure to hand over this manual to the successor and let he/she use product correctly.

⚠ Caution & Warning

Installation Qualifying Condition

Only the person who is qualified for handling designated installation equipment or only skilled technician can install this product.

Prohibition of Product Disassembly

Disassembly of this product can cause loss of life and property by electric shock, breakdown, malfunction, static electricity, etc. Do not disassemble, repair, remodel this product recklessly. If repair is needed, call Helpdesk (+82-1588-7080).

Strict Observance of Operation Condition

This product normally operates in the condition described in product specification. However, if the product keeps operating in condition that it is close to the minimum or maximum value, a probability of loss of life and property increases. Therefore, be sure to predict/check environmental change that each condition range may not approach the minimum or maximum value, and manage that the equipment may operate in median value of operation condition range.

Maintaining Cleanliness of Installation Place

Be sure to tidy up product installation place before and after installation, and do not leave working tools or components alone on the moving path to prevent accident.

FCC Compliance

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.

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.

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

The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body.

IC Compliance

This device contains licence-exempt transmitter(s)/receiver 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.

Cet appareil contient des emetteurs / recepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Developpement economique Canada. Son fonctionnement est soumis aux deux conditions suivantes:(1) Cet appareil ne doit pas provoquer d'interferences.(2) Cet appareil doit accepter toute interference, y compris les interferences qui peuvent provoquer un fonctionnement indesirable de l'appareil.

The antenna should be installed and operated with minimum distance of 20 cm between the radiator and your body.

L'antenne doit etre installe de facon a garder une distance minimale de 20 centimetres entre la source de rayonnements et votre corps.

This device is restricted to indoor use only within the 5150 ~ 5250 MHz.

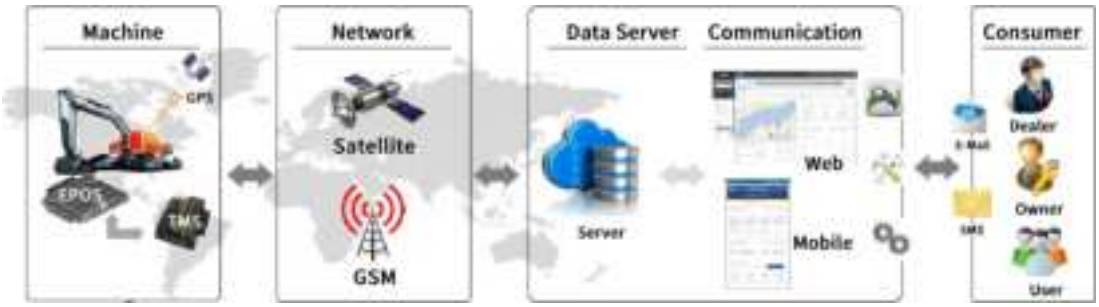
Cet appareil est restreint a l'utilisation a l'interieur seulement dans la bande 5150 ~ 5250 MHz

This equipment is installed exclusively as an OEM (Original Equipment Manufacturer) device by vehicle manufacturers in vehicles.

Cet équipement est installé exclusivement comme un dispositif OEM (Original Equipment Manufacturer) par les fabricants de véhicules dans les véhicules.

2. System Overview

Enables real time monitoring of equipment operating information and state information in a remote place through mobile communication or satellite communication, and, through the real time monitoring, user, dealer, customer can raise efficiency of equipment management.



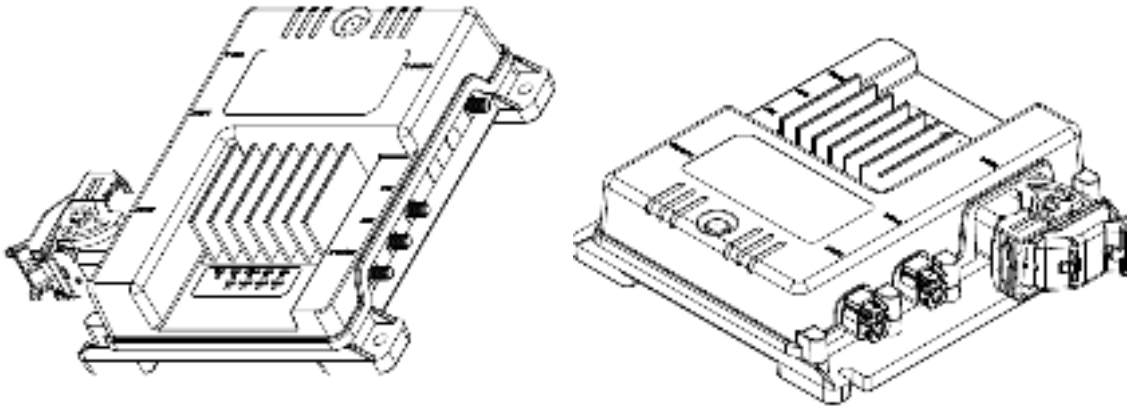


Fig. 2.1 Front/Rear View

3. Product Interface & Specification

This page describes product interface and specification.

3.1 Classification by Product

	TGU	RC-TGU
Satellite	O	O
5G(5G/LTE/3G)	O	O
GPS	O	O
Wi-Fi	X	O
BT	O	O
1000BASE-T1	O	O
100Base-T1	O	O
100Base-TX	O	O
CAN-FD	O	O
CAN-HS	O	O

Tab. 3.1 TGU/RC-TGU Classification by Product

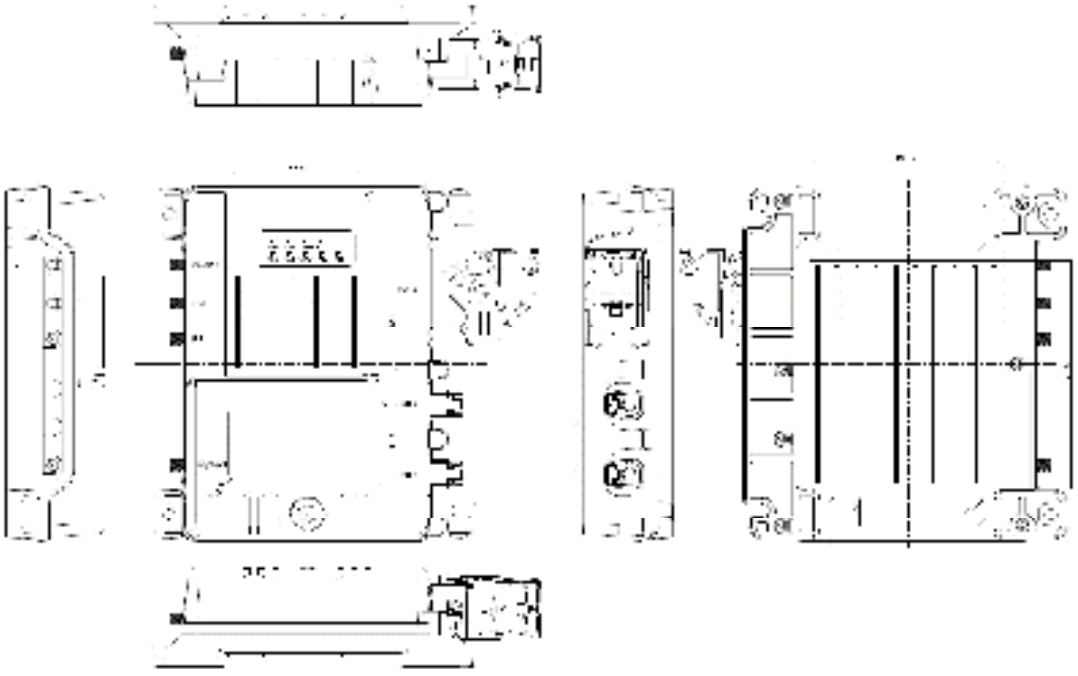


Fig. 3.1 Overall Shape of TGU

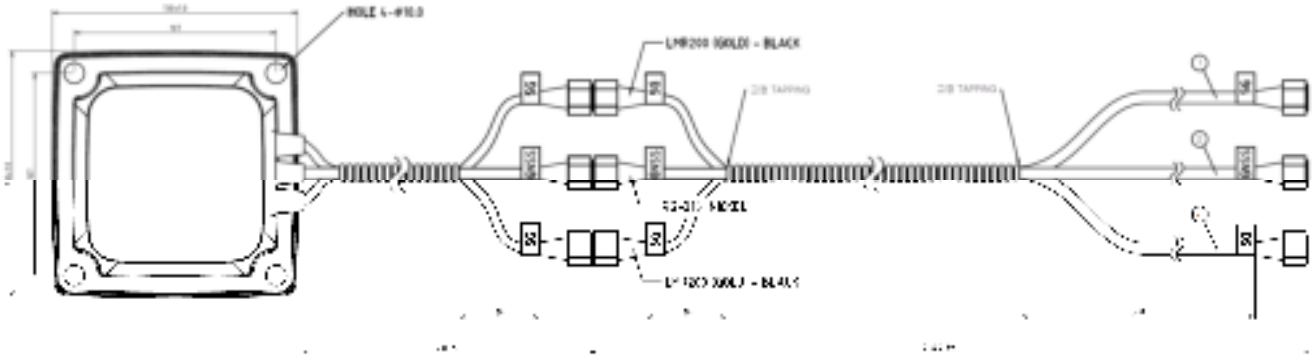


Fig. 3.2 5G/GPS Antenna Shape

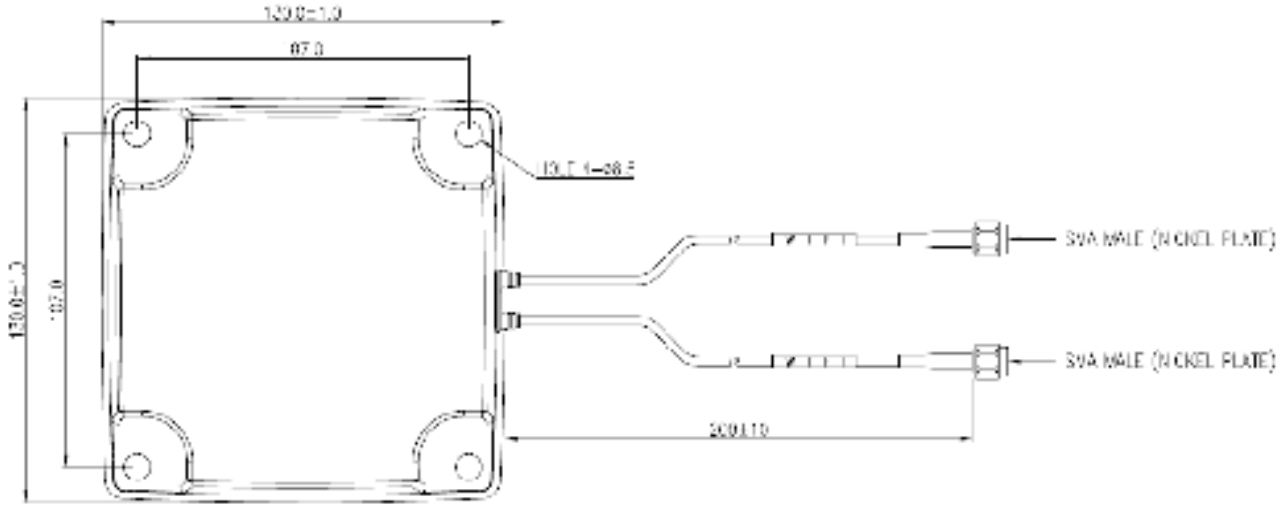


Fig. 3.3 WIFI Antenna Shape (Supported only by RC-TGU)

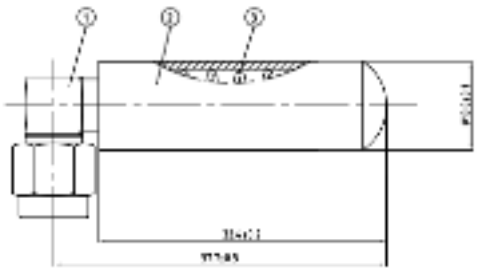


Fig. 3.4 BLE Antenna Shape

3.2 Product Specification

Item	Detail Function	Remarks
● Interface		
INTERFACE	1 x Mandatary Connector	
	2 x 1000Base-T1 Connector	
	2 x 5G Antenna Connector	
	2 x WIFI Antenna Connector	Supported only by RC-TGU
	1 x GPS Antenna Connector	
	1 x BLE Antenna Connector	
● LED Indicator		
LEDs	Power, 5G/4G, 1GE-1, 1GE-2, ETX, SAT GPS, BLE, WIFI	WIFI LED is supported only by RC-TGU
● Power		
DC Input Voltage	12/24VDC	
Consumption Power	Max 45.6W (24V, Battery Charging status)	
Internal Battery	1S2PHL18650V **Charger IC : MAX77976EFD+** **Max Discharge Current: 5.8A** **Charge Voltage: 4.1V** **(-0.060V/+0.040V/-40℃ ~ +85℃)** **Max Charge Current: 2.9A** ***Charge IC Set: Limit : 500mA**	
* Limited Temperature for Charger : -20℃ ~ +60℃ * Limited Temperature for discharger : -40℃ ~ +85℃ Cell Surface Temperature when charged and discharge with Maximum current.		
● Physical Specification		
Size (H x W x D)	171.5x188.41x52mm	
Operation Temperature	-30 ~ +80℃	
Operation Humidity	10~95% RH	
Storage Temperature	-40 ~ +85℃	

Tab. 3.2 TGU Product Specification

3.3 5G/4G/3G Frequency Range

No.	5G NR	SA	NSA	Duplex Mode	Uplink [MHz]	Downlink [MHz]	Regions
1	N1	V	V	FDD	1920–1980	2110–2170	Europe (TBD – Asia, Oceania, Middle East)
2	N2	V	V	FDD	1850–1910	1930–1990	TBD (North America)
3	N3	V	V	FDD	1710–1785	1805–1880	Asia (TBD – Europe, Oceania)
4	N5	V	V	FDD	824–849	869–894	TBD (Europe, North america)
5	N7	V	V	FDD	2500–2570	2620–2690	TBD (Europe, North america, Oceania)
6	N8	V	V	FDD	880–915	925–960	TBD (Europe, Oceania)
7	N12	V	V	FDD	699–716	729–746	TBD (North america)
8	N13	V	V	FDD	777–787	746–756	TBD (North america)
9	N14	V	V	FDD	788–798	758–768	TBD (North america)
10	N18	V	V	FDD	815–830	860–875	TBD
11	N20	V	V	FDD	832–862	791–821	TBD (Europe)
12	N25	V	V	FDD	1850–1915	1930–1995	TBD (North america)
13	N26	V	V	FDD	814–849	859–894	TBD (North america)
14	N28	V	V	FDD	703–748	758–803	Europe, Asia (TBD – Oceania, Middle East)
15	N29	V	V	SDL		717–728	TBD
16	N30	V	V	FDD	2305–2315	2350–2360	TBD (North america)
17	N38	V	V	TDD	2570–2620		TBD
18	N40	V	V	TDD	2300–2400		Asia (TBD – Asia, Oceania, Middle East)
19	N41	V	V	TDD	2496–2690		Asia (TBD - Europe, North America, Middle East)
20	N48	V	V	TDD	3550–3700		TBD (North America)
21	N66	V	V	FDD	1710–1780	2110–2200	TBD (North america)
22	N70	V	V	FDD	1695–1710	1995–2020	TBD (North america)
23	N71	V	V	FDD	663–698	617–652	TBD (North america)
24	N75	V	V	SDL		1432–1517	TBD (Asia)
25	N76	V	V	SDL		1427–1432	TBD (Asia)
26	N77	V	V	TDD	3300–4200		Europe, Asia (TBD - North america)
27	N78	V	V	TDD	3300–3800		Europe, Africa, Asia, Oceania, Middle East (TBD – North/South america)

28	N79	V	V	TDD	4400–5000	Asia

* Module name : RM520N-GL
* Supports 3GPP Rel-16
* Supported modulations:
  - Uplink: π/2-BPSK, QPSK, 16QAM, 64QAM and 256QAM
  - Downlink: QPSK, 16QAM, 64QAM and 256QAM
* Supports SCS 15 kHz and 30 kHz
* Supports SA and NSA operation modes on all the 5G band, but SA network has not been installed in most countries. The only NSA network has been installed until now.
* Some countries in above region couldn't be supported and could be added (TBD).

Tab. 3.3 5G Band

No.	4G LTE	Duplex Mode	Uplink [MHz]	Downlink [MHz]	Regions
1	B1	FDD	1920–1980	2110–2170	Central/South america, Europe, Africa, Asia, Oceania, Middle East
2	B2	FDD	1850–1910	1930–1990	North america, Central/South america
3	B3	FDD	1710–1785	1805–1880	Central/South america, Europe, Africa, Asia, Oceania, Middle East
4	B4	FDD	1710–1755	2110–2155	North america, Central/South america
5	B5	FDD	824–849	869–894	North america, Central/South america, Africa, Asia, Oceania
6	B7	FDD	2500–2570	2620–2690	North america, Central/South america, Europe, Africa, Asia, Oceania, Middle East
7	B8	FDD	880–915	925–960	Central/South america, Europe, Africa, Asia, Oceania, Middle East
8	B12	FDD	699–716	729–746	North america, Central/South america, Oceania, Middle East
9	B13	FDD	777–787	746–756	North america, Central/South america, Asia
10	B14	FDD	788–798	758–768	North america
11	B17	FDD	704–716	734–746	North america, Central/South america
12	B18	FDD	815–830	860–875	Asia
13	B19	FDD	830–845	875–890	Asia
14	B20	FDD	832–862	791–821	Europe, Africa, Asia, Oceania, Middle East
15	B25	FDD	1850–1915	1930–1995	North america
16	B26	FDD	814–849	859–894	Asia

17	B28	FDD	703–748	758–803	North america, Central/South america, Europe, Africa, Asia, Oceania
18	B29	SDL		717–728	North america
19	B30	FDD	2305–2315	2305–2315	North america
20	B32	SDL		1452–1496	Europe
21	B66	FDD	1710–1780	2110–2200	North america
22	B71	FDD	663–698	617–652	North america
23	B34	TDD	2010–2025		TBD
24	B38	TDD	2570–2620		North america, Central/South america, Europe, Africa, Asia, Middle East
25	B39	TDD	1880–1920		Asia
26	B40	TDD	2300–2400		Europe, Africa, Asia, Oceania, Middle East
27	B41	TDD	2496–2690		North america, Africa, Asia, Oceania
28	B42	TDD	3400–3600		North america, Central/South america, Europe, Asia, Middle East
29	B43	TDD	3600–3800		North america, Central/South america, Europe, Asia
30	B46 (LAA)	TDD	5150–5925		North america, Europe
31	B48	TDD	3550–3700		North america

* Module name : RM520N-GL
* Supports 3GPP Rel-16
* LTE Category: DL Cat 19, UL Cat 18
* Supported modulations:
  - Uplink: QPSK, 16QAM and 64QAM and 256QAM
  - Downlink: QPSK, 16QAM and 64QAM and 256QAM
* Supports 1.4/3/5/10/15/20 MHz RF bandwidth
* Some countries in above region couldn't be supported and could be added.

Tab. 3.4 LTE Band

No.	3G WCDMA	Duplex Mode	Uplink [MHz]	Downlink [MHz]	Regions
1	B1	FDD	1920–1980	2110–2170	Central/South america, Africa, Asia, Europe, Middle east
2	B2	FDD	1850–1910	1930–1990	North america, Central/South america

3	B4	FDD	1710–1755	2110–2155	North america, Central/South america
4	B5	FDD	824–849	869–894	North america, Central/South america
5	B8	FDD	880–915	925–960	Central/South america, Europe, Africa, Asia, Oceania, Middle east
6	B19	FDD	830–845	875–890	Asia

* Module name : RM520N-GL
* Supports 3GPP Rel-9 DC-HSDPA, HSPA+, HSDPA, HSUPA and WCDMA
* Supports QPSK, 16QAM and 64QAM modulation
* Some countries in above region couldn't be supported and could be added.

Tab. 3.5 WCDMA Band

3.4 GNSS Frequency Range

Parameter	Value
Frequency Range (L1 band)	
GPS	1575.42 ±1.023 MHz (L1)
Galileo	1575.42 ±2.046 MHz (E1)
QZSS	1575.42 MHz (L1)
GLONASS	1597.5 MHz to 1605.8 MHz
BDS	1561.098 ±2.046 MHz
Input Impedance	50 Ω
Output voltage	3.3V

* Module name : RM520N-GL

3.5 Wi-Fi Frequency Range

Parameter	Value
Frequency Range	
802.11b/g/n/ax	2400 MHz to 2500 MHz
802.11a/n/ac/ax	4900 MHz to 5925 MHz
Input/Output Impedance	50 Ω
Standard version	Wi-Fi6
Data rates	
802.11b	1, 2, 5.5, 11 Mbps
802.11a/g	6, 9, 12, 18, 24, 36, 48, 54 Mbps
802.11n (SISO, MIMO)	MCS0 to MCS15 and 32 (Duplicate 6Mbps)
802.11ac (SISO, MIMO)	MCS0 to MCS9
802.11ax (SISO, MIMO)	MCS0 to MCS11

Tab. 3.6 Wi-Fi Frequency Specification

* Module name : JODY-W377

3.6 BLE Frequency Range

Parameter	Value
Frequency Range	2400 MHz to 2483.5 MHz
Input/Output Impedance	50 Ω
Standard version	5.0
Data rates	Uncoded PHY (1, 2 Mbit/s), Coded PHY (125, 500 kbit/s)

Tab. 3.7 BLE Frequency Specification

* Part name : MKW38Z512VFT4

3.7 Product Interface

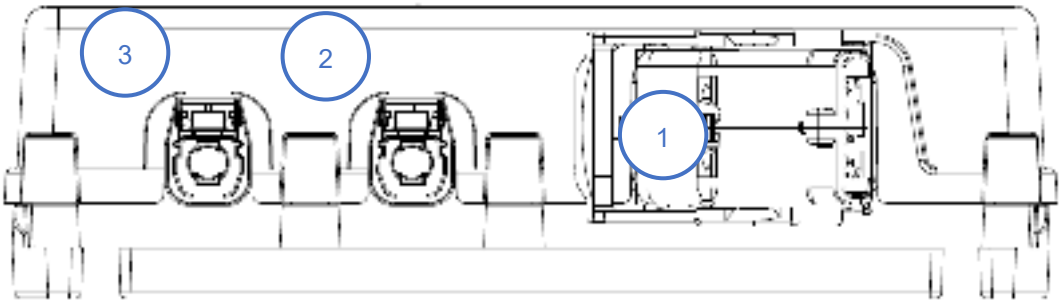


Fig. 3.5 Front Common Connector Shape of TGU

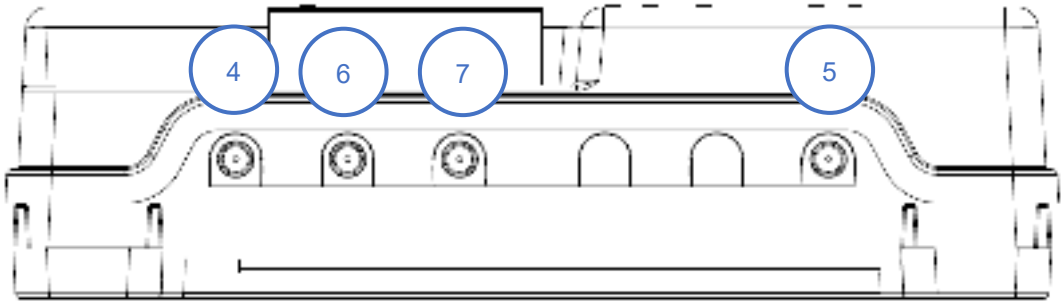


Fig. 3.6 Rear Connector Shape of TGU

No.	Item	Function	Connector Type
1	Main Connector	Power Alternator Key On CAN Security Serial RX/TX Cold Reset 100Base-TX 100Base-T1	500762-0481
2	1000Base-T1 #1	1000Base-T1	1802162-1
3	1000Base-T1 #2	1000Base-T1	1802162-1

4	5G/4G-1	5G/4G/3G	S510-2654-A Nut Color : GOLD
5	5G/4G-2	5G/4G/3G	S510-2654-A Nut Color : GOLD
6	GPS	GPS	S510-2654-A Nut Color : NICKEL
7	BLE	BLE	S510-2654-A Nut Color : NICKEL

Tab. 3.8 TGU Interface Specification

Fig. 3.7 Main Connector PINMAP1

AP_UART_RX	MCU2_UART_RX	100BASE-TX RXN	100BASE-TX TXN	A
AP_UART_TX	MCU2_UART_TX	100BASE-TX RXP	100BASE-TX TXP	B
VEXT_IRI	EXT_SAT_UART_RXD	EXAT_SAT_ONOFF	EXT_RST	C
DGND	EXT_SAT_UART_TXD	EXT_SAT_NETWORK	100BASE-T1 P	D
MCU_UART_RX	ECU1_UART_RX	DIGITAL_IN	100BASE-T1 N	E
MCU_UART_TX	ECU1_UART_TX	EXT_KEY_ON	SECURITY	F
EXT_ESU_ONOFF	HSCAN_H_CH1	HSCAN_L_CH3	CANFD_H_CH1	G
DGND	HSCAN_L_CH1	HSCAN_H_CH3	CANFD_L_CH1	H
-	HSCAN_H_CH2	HSCAN_L_CH4	CANFD_H_CH2	J
EXT_ACC_ON	HSCAN_L_CH2	HSCAN_H_CH4	CANFD_L_CH2	K
ALTERNATOR	DGND	MGDN	MBAT	L
-	STARTER	SMK	MGND	M
1	2	3	4	

Fig. 3.8 Main Connector PINMAP2

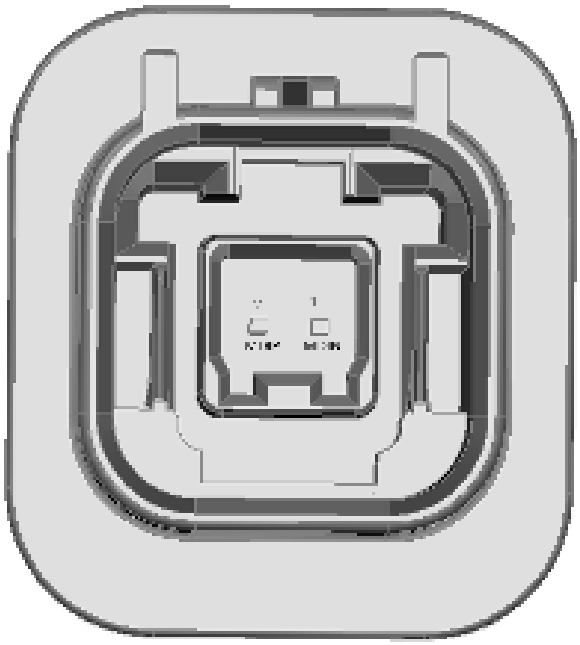


Fig. 3.9 1000Base-T1 Connector PINMAP

3.8 Product Antenna Specification

Item	Part No.	Connector Type	Length [mm]	
5G/GPS	KYP ANTTENNA R9	5G : SMA-Male GPS : SMA-MALE(Reverse)	3000	TGU/RC-TGU
BLE	FST-BT-STB	SMA-Male	37	TGU/RC-TGU
WIFI	HAG-TGU-WIFI-D	SMA-Male	200	RC-TGU

Tab. 3.9 TGU Antennal Specification

3.9 LED Specification

Item	Color	State	Interval	Description	
Power (Key on)	Green	Blinking	1000ms	Key On	TGU/RC-TGU
	Green	Lighting		Engine On	
	Yellow	Lighting		Internal Battery Charge & Under 50% Capacity	
	Yellow	Blinking	500ms	Undefined Model	
	Red	Lighting		Harness Failure	
	Red	Blinking	500ms	Fault Code	
Power (Key off)	Yellow	Blinking	1,000ms	Mbat Sleep (Sleep Vbat Event)	TGU/RC-TGU
	Yellow	Blinking	1,000ms	Deep mode (Sleep Deep Event)	
	Yellow	Blinking	1,000ms	Wake up (in Mbat Sleep status)	
5/4G	Red	Blinking	500ms	LTE Module / USIM Fault	TGU/RC-TGU
	Yellow	Lighting		Unregistered (Roaming Failed)	
	Yellow	Blinking	1,000ms	Registering	
	Green	Lighting		Normal - Standby	
	Green	Lighting	500ms	Data Sending / Receiving	
SAT	Green	Lighting		Satellite in View	TGU/RC-TGU
	Yellow	Lighting		No Satellite in View	
	Green	Blinking	500ms	Data Sending / Receiving	
	Red	Lighting		Antenna Disconnected (Short/Open)	
	Red	Blinking	500ms	SAT Module Fault	
GNSS	Yellow	Lighting		GPS Satellite is not sensed.	TGU/RC-TGU
	Green	Lighting		Normal	
	Red	Lighting		Antennal Non-Connection	
	Red	Blinking	500ms	GNSS Module Fault	
BLE	Yellow	Lighting		BLE is not sensed	TGU/RC-TGU
	Green	Lighting		Normal	
	Red	Lighting		Antennal Non-Connection	
1GE-1	Green	Lighting		Link Up	TGU/RC-TGU
	Green	Blinking		Linked and DATA TX or RX	
1GE-2	Green	Lighting		Link Up	TGU/RC-TGU
	Green	Blinking		Linked and DATA TX or RX	

ETX	Green	Lighting		Link Up	TGU/RC-TGU
	Green	Blinking		Linked and DATA TX or RX	
ET1	Green	Lighting		Link Up	TGU/RC-TGU
	Green	Blinking		Linked and DATA TX or RX	
WIFI	Yellow	Lighting		WIFI is not sensed.	RC-TGU
	Green	Lighting		Normal	
	Red	Lighting		Antennal Non-Connection	

Tab. 3.10 TGU/RC-TGU LED Specification

4. Installation Preparation

4.1 Installation Method

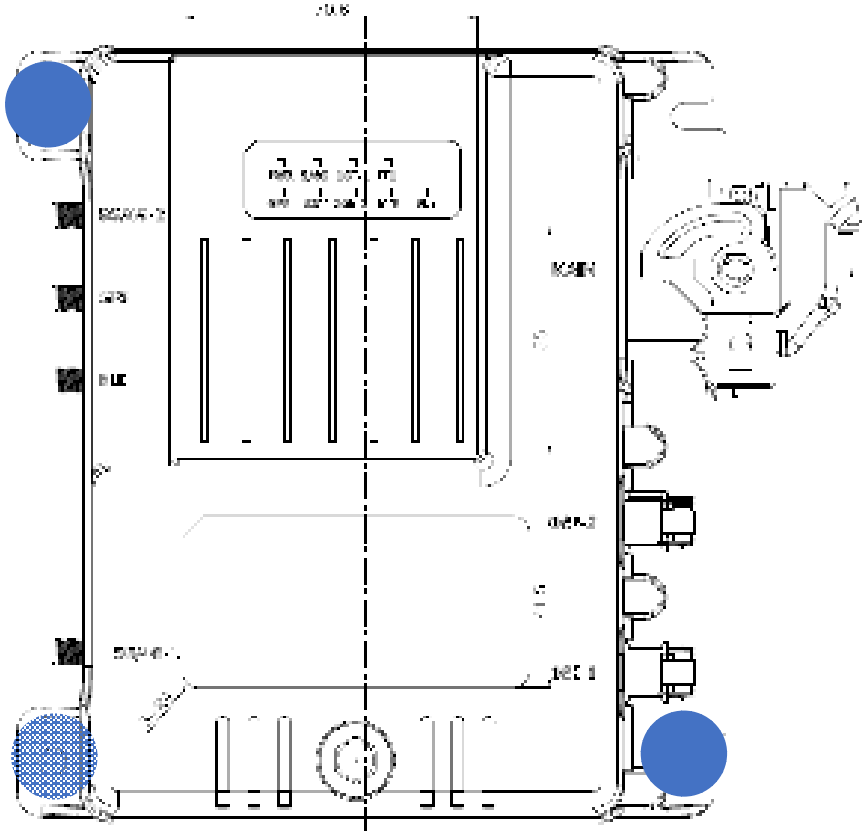


Fig. 4.1 Installation Block Diagram of TGU

*** Blue Colored Location: Screw Hole Installation**

*** Mounting Height: Under 2m**

*** Screw Specification**

PN: S0504653 (M6X1.0X16)

Surface treatment: Black

Strength: 8.8

Material: SM45C/SM50C

Fig. 4.2 Mounting Example of TGU