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Flaircomm Microelectronics, Inc.

FLC-WNP296 Data sheet

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1. Product introduction

1.1 Document Confidentiality

The content of this document is highly confidential and disclosure is permitted only when necessary. Before distributing this document, the recipient must sign a non-disclosure agreement with Flairmicro. For copying, citing any part of this document, or quoting product specification information from this document, the consent and confirmation of Flairmicro must be obtained.

1.2 Documentation Coverage

This document covers the FLC-WNP296 system framework, functional description, performance specifications and electrical characteristics. This document also introduces the detailed definitions of components and product interfaces within the FLC-WNP296 system.

1.3 Features

- FLC-WNP296 is a multi-function, low-power, remote monitoring terminal system specially designed for vehicle applications;
- Can support ECALL, BCALL, car search, anti-theft alarm, electronic fence, remote vehicle status query and other services;
- Can support MP3 download and playback, 4G mobile hotspot and other entertainment functions;
 - WAN: Support voice calls and data services;
 - Support 2G, 3G and 4G voice and data services of China Unicom, China Mobile and China Telecom
 - GNSS: Support GPS, GLONASS, BeiDou and Galileo satellite systems;
 - Support up to 40 follower channels
 - 2.046 MHz BW NB GPS ; 14 GLONASS high-precision tracking channels
 - CAN: Compliant with CAN 2.0B specification, supports three high-speed CAN channels, one of which can support CAN FD;
 - G-Sensor: Support collision wake-up and alarm in flameout state;
 - Spare battery : Optional built-in 500mAh rechargeable Ni-MH battery supports business operation after the external power supply fails.

1.4 Applications

- Internet of Vehicles
- Car anti-theft system
- In-vehicle entertainment subsystem
- Vehicle rescue alarm system

2. Acronym

Acronym	Describe
'E' Marks	European regulatory approval numbers
μP	Microprocessor
ABS	Anti-Lock Brake System
BCM	Body Controller Module
CAN	Controller Area Network
CVBS	Composite Video Baseband Signal
DAB	Digital Audio Broadcast
DTC	Diagnostic Trouble Code
DSP	Digital Sound Processor
ECU	Electronic Control Unit
EMC	Electro Magnetic Compatibility
E ² PROM/EEPROM	Non-Volatile Memory For Storing Coding And Balancing Data
H/U	Head Unit
HS-CAN	High Speed CAN
ICE	In Car Entertainment
IPK	Instrument Cluster
ISO	International Standards Organization
KL 30	Battery Positive
KL 31	Battery Ground
KL.R	Auxiliary (Ignition Pos1)
KL 15	Ignition (Ignition Pos 2)
KL 50	Crank (Ignition Pos 3)
LIN	Local Interconnect Network
LVDS	Low Voltage Differential Signal
MS-CAN	Medium Speed CAN
PCB	Printed Circuit Board
TBD	to be determined
USB	Universal Serial Bus

Table 1: Acronym

3. System specification

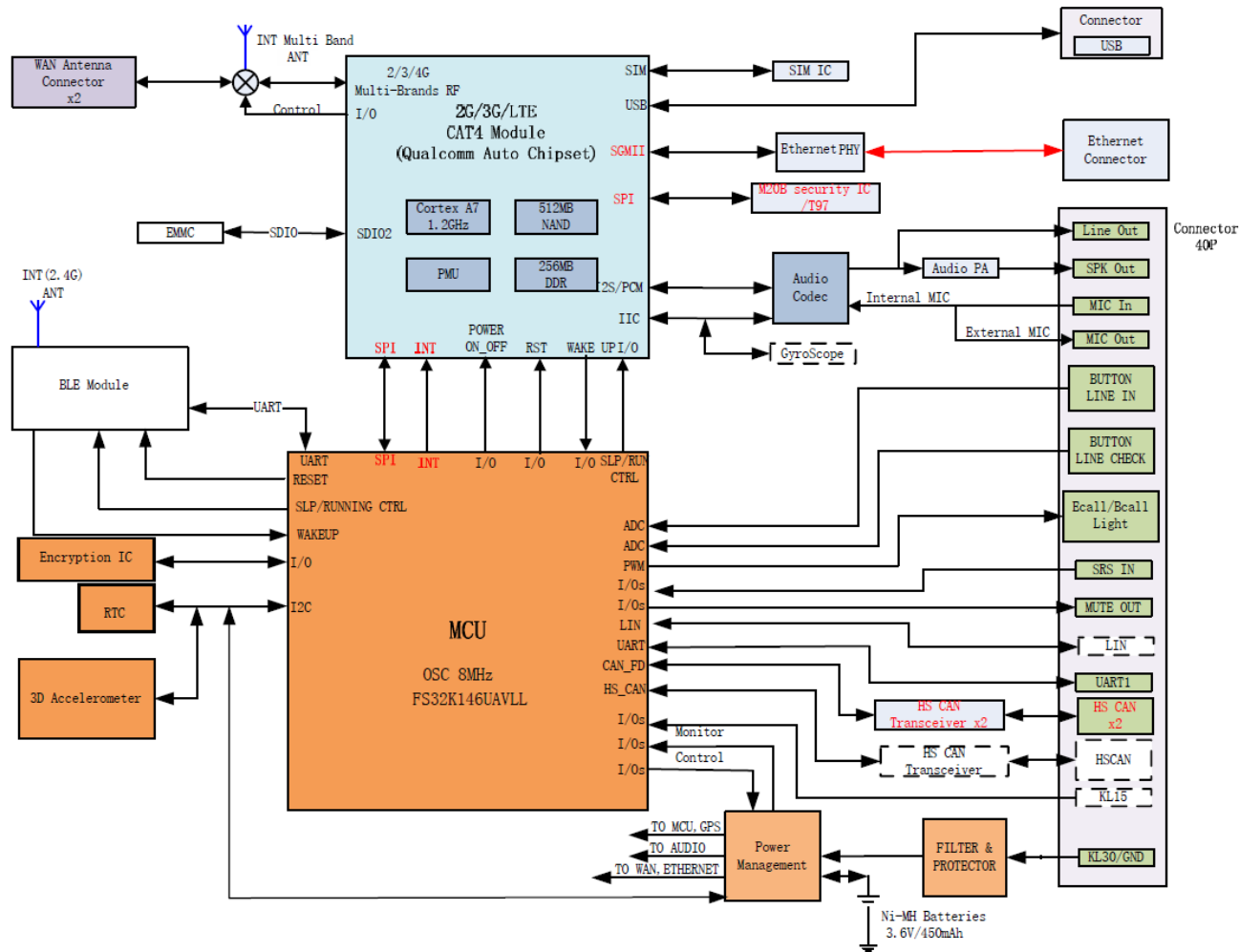


Chart 1: System block diagram

4. Functional Overview

This product can provide car owners with security and entertainment functions.

4.1 Security function

Function	Describe
Engine start report	Every time the engine starts, this product will upload the relevant vehicle information to the background server at the time of starting
Engine stall report	Every time the engine is turned off, this product will upload the relevant information of the vehicle and the driving process to the background server when the engine is turned off
Check vehicle status remotely	Through the CAN bus, this product grasps the vehicle status information and uploads it to the background service center in time. Users can query the real-time information of the current vehicle status through the background server
Vehicle Remote Tracking	The user can query the vehicle driving position information within a period of time through the background server
Driving behavior reminder	When the current driving behavior of the car owner may have potential safety hazards, this product will upload the information to the background server, and send reminder information to the mobile APP bound to the vehicle through the background server.
Vehicle abnormality alarm	This product monitors the current vehicle status in real time. When the vehicle itself is abnormal or the vehicle is dragged abnormally, this product will send an alarm message to the background server
E-Call	In case of emergency, the user can press this key to connect to the call center with the highest priority, and the human agent will simultaneously obtain important data of the customer and the vehicle and assist the driver to get out of danger
B-Call	If the vehicle fails, press this key to send a "road assistance" signal to the back-end service center of the Internet of Vehicles, and obtain a series of help such as a trailer under the coordination of the call center

Table 2:Security function

4.2 Entertainment function

Function	Describe
Assisted Inertial Navigation	This product sends the vehicle motion information to the mobile APP in real time through the background server to assist the navigation program on the mobile APP to realize the inertial navigation function
I-Call	Press this key to connect to the manual agent of the call center, the product will upload the current location to the background server for destination query and navigation
Play music	The user downloads music from the background server to the product, and uses the mobile APP to control the product to play music, and the user can hear the currently playing music through the radio

Table 3:Entertainment function

4.3 Product maintenance function

Function	Describe
Product testing	Maintenance personnel can connect to this product through USB, use PC tools to detect the current hardware status of this product and read historical Log records
Product upgrade	Maintenance personnel can upgrade the software of this product through USB connection with this product or OTA
Product parameter configuration	Configure the relevant business parameters of this product through USB connection with this product or OTA. Configurable parameters include (TSP service parameters, binding mobile phone list update, flow control, etc.)
Product activation	Activate this product through OTA, and only after activation can this product provide all services

Table 4:Product maintenance function

4.4 self-test

FLC-WNP296 has a complete self-test function as listed below:

1. All peripheral main function devices work status self-check;
2. Power supply and battery self-test;
3. All connectors including RF connectors and electrical connectors open circuit, short circuit self-test;
4. Self-check fault report service background;
5. The predefined can failure report frame is sent cyclically;
6. Through the OTA protocol Report the fault data to the service background.

5. Performance Specifications

WAN	
Standard	GSM/WCDMA/FDD-LTE/TDD-LTE
Frequency band	GSM850/GSM1900 WCDMA B2/B4/B5 FDD-LTE B2/B4/B5/B7 TDD-LTE B41M
Maximum transmit power	GSM900 33dBm±2dB GSM1800 30dBm±2dB WCDMA 23dBm±2dB FDD-LTE 23dBm±2dB TDD-LTE 23dBm±2dB
Receive sensitivity	GSM < -102dBm WCDMA < -106.7dBm LTE < -97dBm@5MHz
RF impedance	50 ohm
Antenna	Built-in antenna Fakra Connector (External Dual Antenna)
Bluetooth (Optional)	
Standard	Bluetooth 5.1 (BLE only)
Frequency Span	2.402GHz ~ 2.480GHz
RF TX Power	<6dBm
Sensitivity	-93dBm
Antenna	Chip Antenna
GNSS	
Beidou frequency band	1561.098MHz
GPS band	1575.42 MHz
GLONASS band	1602MHz
Galileo band	1561.098 MHz

Aisle	40 follower channel 40 star channel	
RF input impedance	50 ohm	
Precision	Location	<10m（RMS）
		<5m（WAAS）
		<2.5m（DGPS）
	Speed	0.1m/s
	Time	1us
Sensitivity	Capture	-142dBm
	Track	-160dBm
Start Time (in an open environment)	Hot Start	<3s
	Warm start	<45s
	Cold start	<60s
Antenna	Fakra connector, external 5V active antenna	
Power supply		
Supply voltage	9 ~ 16V DC	
Power consumption	Fully functional working state	<20W（0.5-1A）
	Listening state	<36mW（3mA）
	Sleep state	<3mW（250uA） @with bluetooth
	Power off state	<360uW（30uA）
Operating environment		
Temperature	Business function: -40° C to +85° C; Entertainment function: -20° C to +70° C	
Humidity	<95%RH(no condensation)	
Certification	/	
Environmental Protection	RoHS certified, PP standard number: TL 52388	
Dimensions and Weight		
Package size mm(L)*mm(W)*mm(H)	155*75*31.5 (without socket); 155*86.1*31.5 (with socket)	

Weight(g)	268 ± 10 (with battery); 228 ± 10 (without battery)
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Table 5: Performance Specifications

6. Mechanical properties

6.1 Physical map

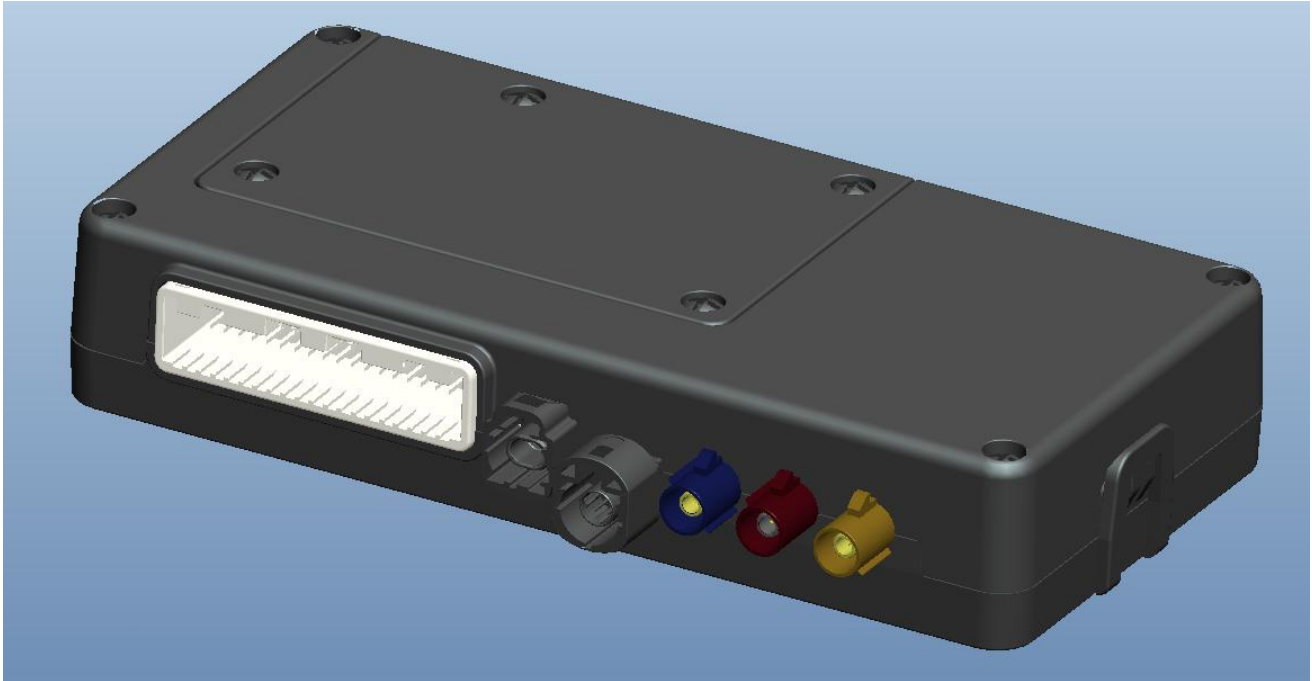


Chart 2: Physical map

6.2 3D dimension drawing

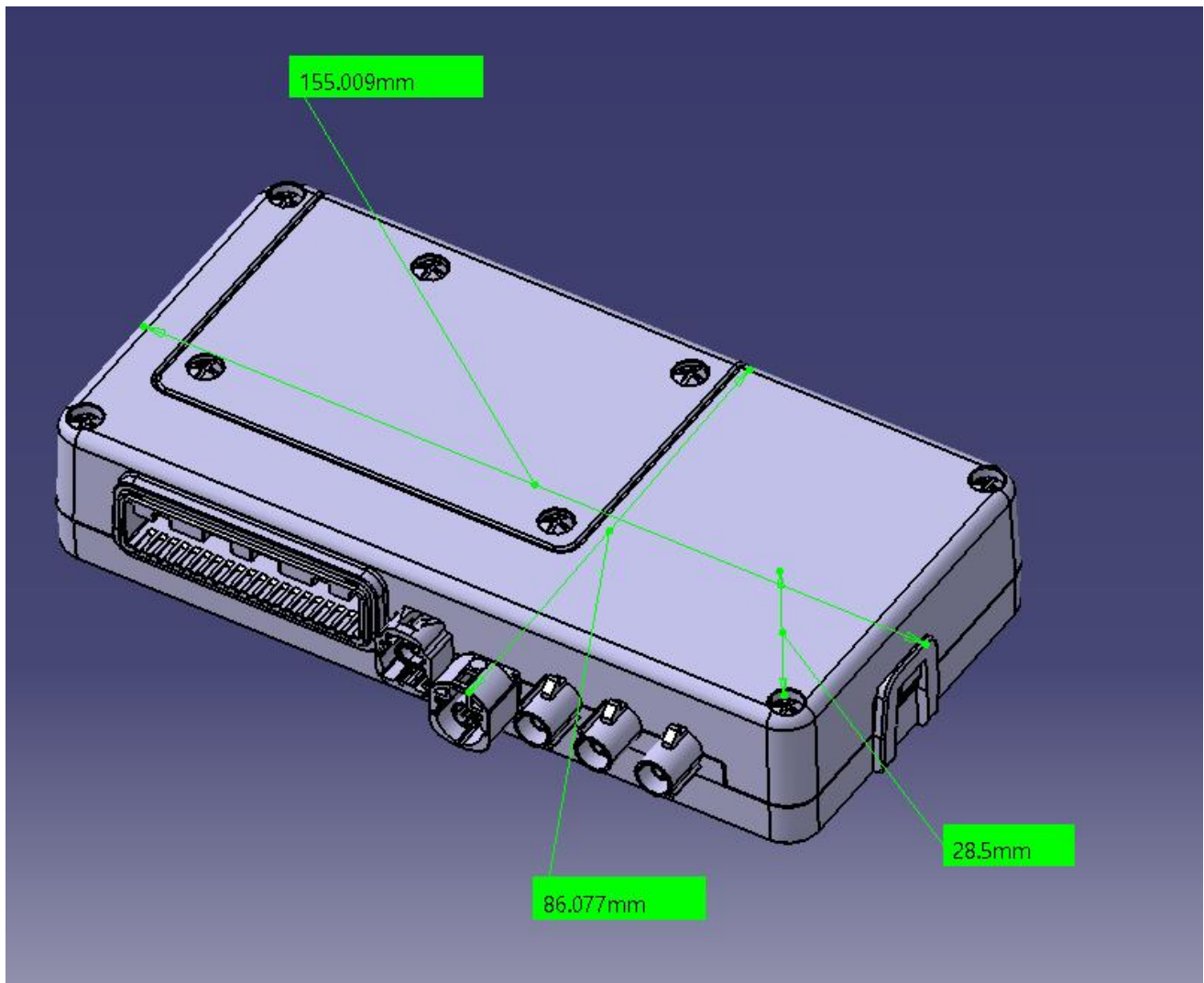


Chart 3: 3D dimension drawing

6.2.1 Top view

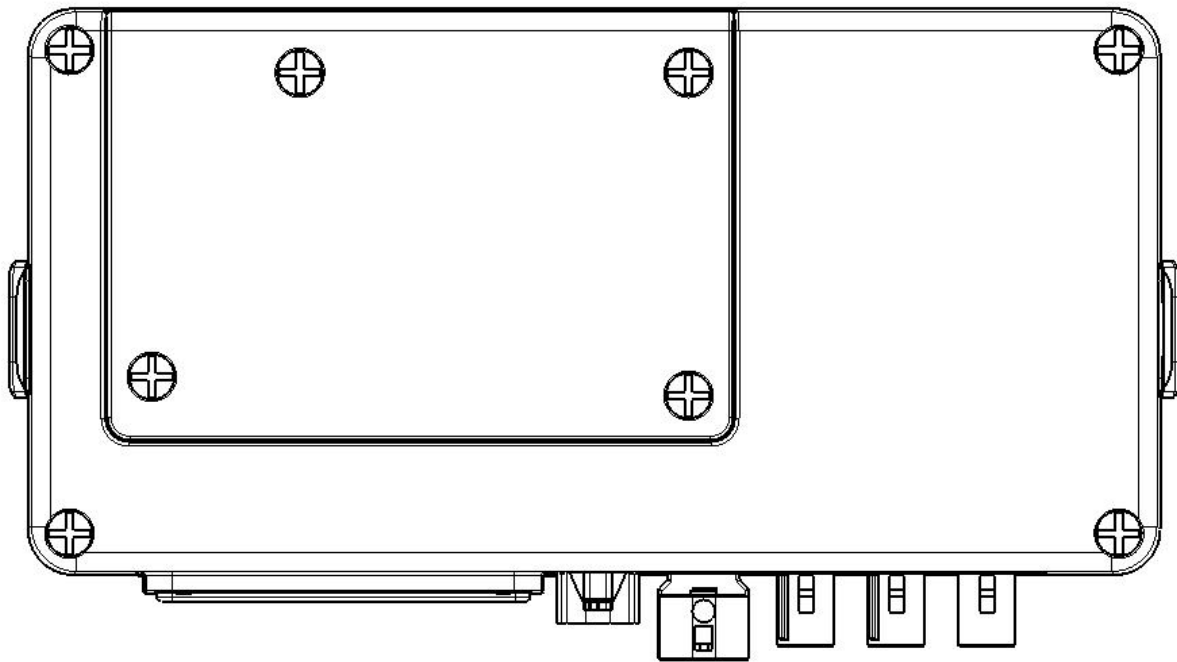


Chart 4: Top view

6.2.2 Bottom view

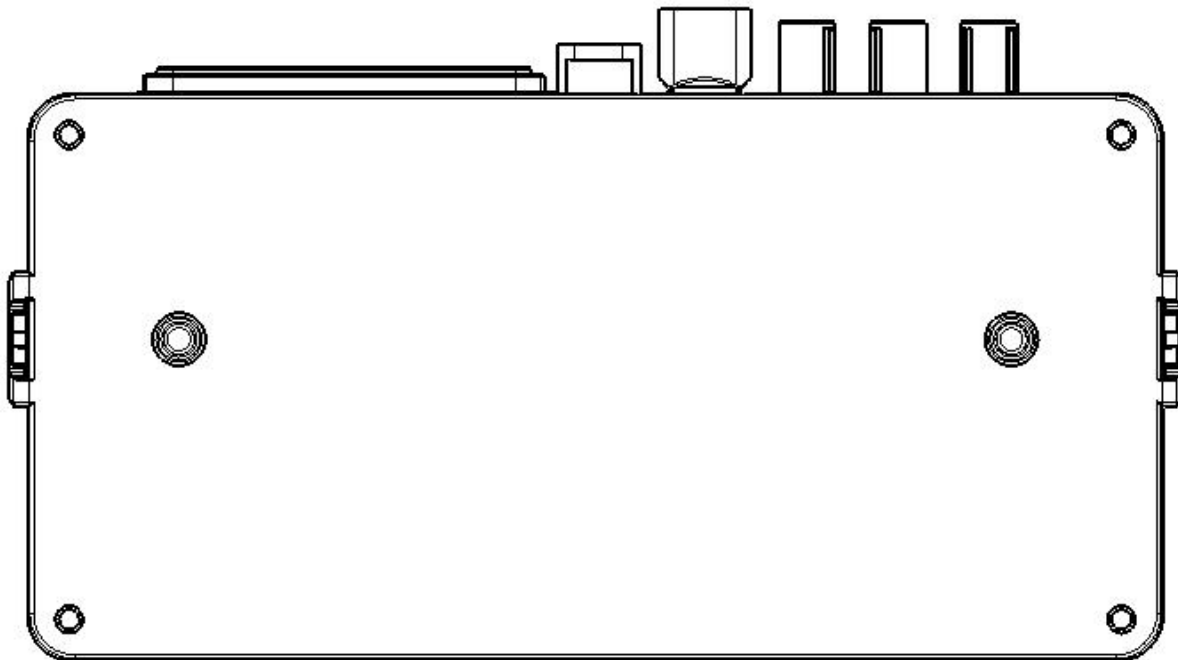


Chart 5: Bottom view

6.2.3 Front view

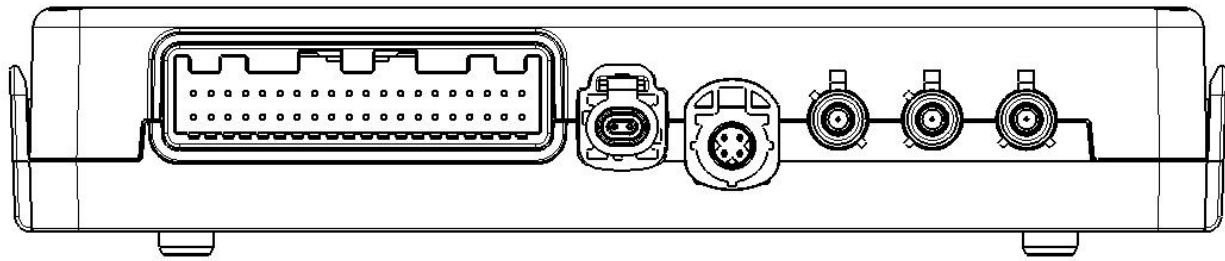


Chart 6: Front view

6.2.4 Rear view

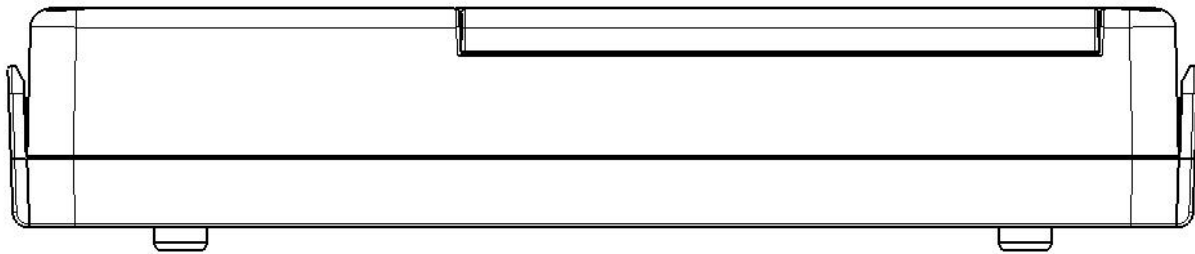


Chart 7: Rear view

6.2.5 Left view

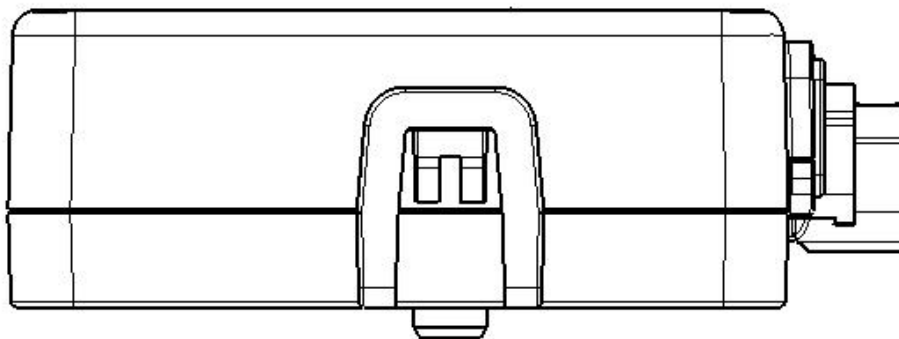


Chart 8: Left view

6.2.6 Right elevation

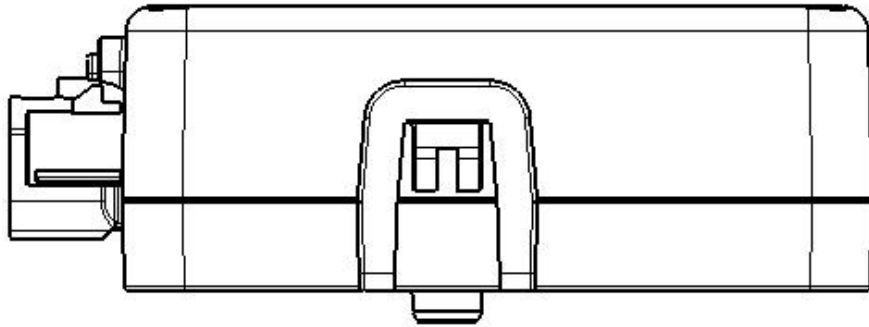


Chart 9: Right elevation

7. Connector Specifications

7.1 WNP26X connector packaging

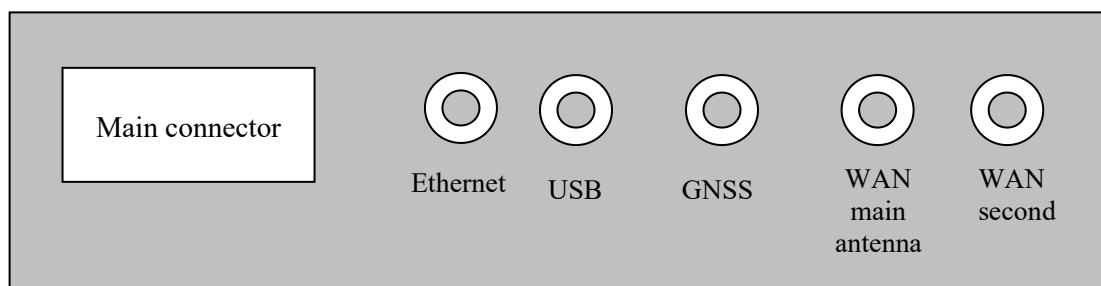


Chart 10: connector packaging

7.2 Connector model

Connector	Connector model
Main joint	Tyco Electronics 025 Series 40P
USB	connector(HSD)
GNSS Antenna connector	FAKRA Code C male
WAN Main antenna connector	FAKRA Code D male
WAN Sub-antenna connector	FAKRA Code K male
Ethernet connector	H-MTD

Table 6: Connector model

7.3 pin configuration

7.3.1 Main connector pin arrangement

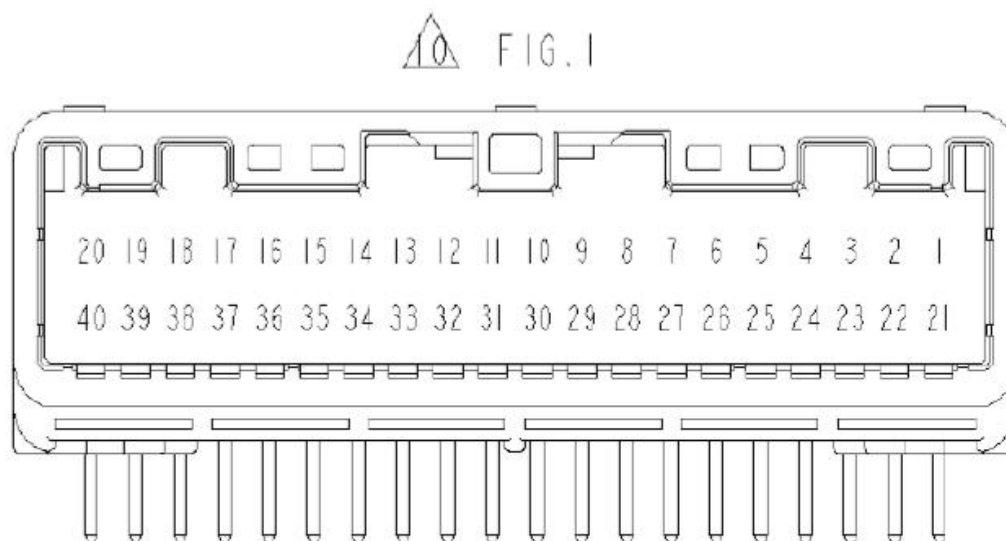


Chart 11: Pin arrangement

7.3.2 Main pin definition

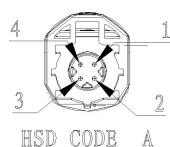
Pin number	Pin name	Signal description	I/O
1	KL 15* ¹	Ignition Signal	Input
2	QCW* ¹	Qucik Charge Wakeup Signal	Input
	VLED* ¹	Power supply for External LED Power Supply	Output
3	GND		
4	SCW* ¹	Slow Charge Wakeup Signal	Input
	SOS_BL_EN* ¹	PWM Control Signal For SOS Backlight	Output
5	MIC OUT GND* ¹	MIC OUT GND to FICM	Output
6	MIC IN* ¹	MIC Signal Input	Input
7	Spare		
	GND		
8	LINE OUT +	Line Out plus to FICM	Output
9	Speaker +	Speaker Output plus to External Speaker	Output
10	BTN GND	External Button GND	
11	SRS	Airbag Deployed Signal	Input
12	LED GND	External LED GND	
13	Spare		
14	Spare		
15	UART RX	TBOX UART Rx	Input
16	Spare		
	GND		
17	HSCAN3_H	CAN_H of HSCAN3 (ISO-11898-2)	Input / Output

18	HSCAN2_L	CAN_L of HSCAN2 (ISO-11898-2)	Input / Output
19	HSCAN1_H	CAN_H of HSCAN1 (ISO-11898-2)	Input / Output
20	KL 30	Main Power	Input
21	Spare		
22	Spare		
23	GND		
24	OUT_L* ¹	Digital Signal Output	Output
25	MIC OUT* ¹	MIC OUT Signal to FICM	Output
26	MIC IN GND* ¹	MIC Signal Input GND	Input
27	Spare		
	GND		
28	LINE OUT -	LINE OUT minus to FICM	Output
29	Speaker -	Speaker Output minus to External Speaker	Output
30	BTN	External Button Detect	Input
31	BTN CON	External Button board Connect Detect	Input
32	MUTE	MUTE Signal to FICM	Output
33	LED_S_2	Output to BCALL Indicator LED	Output
34	LED_S_1	Output to ECALL Indicator LED	Output
35	UART TX	TBOX UART Tx	Output
36	KL 15* ¹	Ignition Signal	Input
	Spare		
37	HSCAN3_L	CAN_L of HSCAN3 (ISO-11898-2)	Input / Output
38	HSCAN2_H	CAN_H of HSCAN2 (ISO-11898-2)	Input / Output
39	HSCAN1_L	CAN_L of HSCAN1 (ISO-11898-2)	Input / Output
40	KL 31	Main Power GND	Input

Table 7: Pin definition

*1: Special versions of software and hardware settings are required.

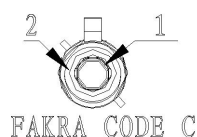
7.3.3 USB pl-in PIN definition



number	Signal name	description	direction	range
1	VBUS	USB Power	Input/Output	4.75V ~ 5.25V
2	USB +	USB+	Input/ Output	
3	USB GND	Ground		0V
4	USB -	USB -	Input/Output	

Table 8: USB Plug-in pin definition

7.3.4 GNSS Antenna connector PIN definition



number	Signal name	description	range
1	GNSS SIG	GNSS Antenna Signal	5V
2	GND	Ground	0V

Table 9 : GNSS Antenna Fakra Pin definition

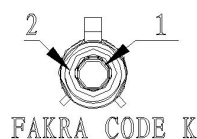
7.3.5 WAN Main antenna plug-in PIN definition



number	Signal name	description	range
1	WAN SIG	WAN Antenna Signal	3.3V
2	GND	Ground	0V

Table 10: WAN main antenna Fakra Pin definition

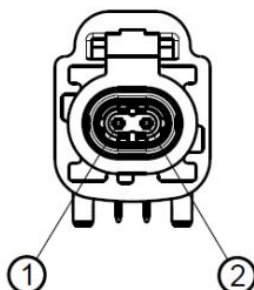
7.3.6 WAN Sub-antenna connector PIN definition



number	Signal name	description	range
1	SIG	WAN Antenna Signal	3.3V
2	GND	Ground	0V

Table 11: WAN Auxiliary antenna Fakra Pin definition

7.3.7 The Ethernet connector plug-in PIN definition



number	Signal name	description	range
1	TRP	Ethernet interface negative pole	-2-+2V
2	TRN	Ethernet interface positive pole	-2-+2V

Table 12: Ethernet connector pin definition

7.4 Physical interface

7.4.1 Power Supply

7.4.1.1 Power input

KL 30&KL 31 is the power supply interface of the product, which is connected with the battery of the vehicle. Usually, the voltage supplied by the vehicle engine is 14V when it is started, and the shutdown state of the vehicle generator depends on the power of the battery itself.

KL 15 is the power-on start interface of product hardware, which connects the vehicle KL 15 harness and detects the ACC ON/OFF signal.

7.4.1.2 work pattern

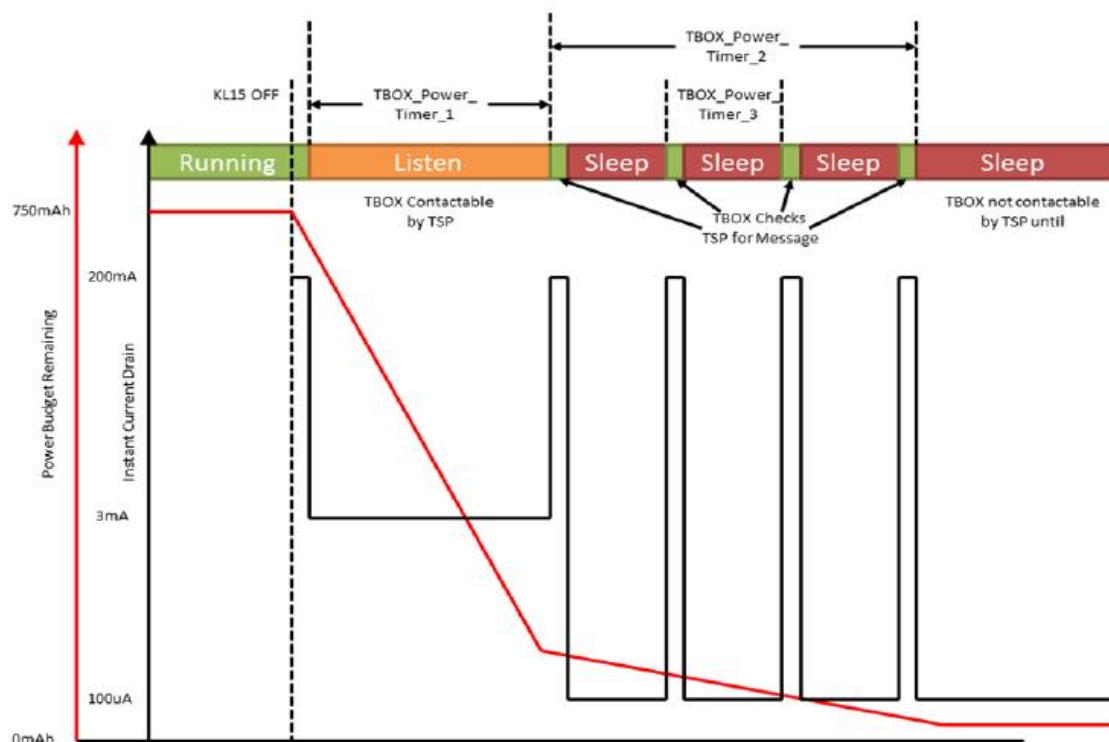


Chart 12: Schematic diagram of working mode

The time parameters involved in the figure: TBOX_Power_Timer1、TBOX_Power_Timer2、TBOX_Power_Timer3 is configurable parameter, with meaning is as follows:

TBOX_Power_Timer1: Duration of T-BOX in the Listen state, and T-BOX will enter Sleep mode when the timer exceeds this time.

TBOX_Power_Timer2: When the T-BOX is in Sleep mode, Total time for automatically waking

up and accessing the server periodically.

TBOX_Power_Timer3: When the T-BOX is in Sleep mode, Time interval for automatically waking up and accessing the server periodically.

In the 'Listen' mode, T-BOX will wake up because of Telematics service or mobile detection. In order to ensure the overall current consumption of T-BOX, When the number of wakeups for triggering Telematics service or mobile detection reaches TBOX_Permitted_Wakeups, the total time of TBOX_Power_Timer1 running in Listen mode will be reduced by TBOX_Wakeup_Penalty every time TBOX wakes up. The meaning of the parameter is as follows:

TBOX_Permitted_Wakeups: The number of times that the TBOX is allowed to be awakened in one Listen mode; When this number is exceeded, each wake-up will reduce the total duration in Listen mode.

TBOX_Wakeup_Penalty: Time of each reduction.

7.4.2 Standby power supply-optional

The product can be equipped with a rechargeable nickel-hydrogen battery with built-in 500mAh as the standby power supply, and the standby battery can be charged during the operation of the product to ensure that the battery power can cope with emergencies. Under normal conditions, the standby battery does not discharge to the outside. Only when the external power supply is abnormal during the operation of the product can the product switch to the internal standby battery channel for power supply.

7.4.3 Power status

The product can support four power states:

- Shutdown mode (off)
- Normal working mode (running)
- Listening mode (listen)
- Sleep mode (sleep)

7.4.4 MIC IN

The MIC interface on the main connector of the product can be connected with an active MIC as the receiver of voice call.

MIC parameter requirements: 5V/430R

7.4.5 MIC OUT

When the product itself does not use the MIC, it can be set to the ByPass status, and the MIC is connected to the entertainment host for its use. At this time, the MIC output electrical performance is consistent with the current MIC parameters.

MIC parameter requirements: 5V/430R

7.4.6 LINE OUT

The LINE OUT interface on the main connector of the product is connected to the audio of the entertainment host, and can output differential audio signals to the outside, which can be used as the call output and MP3 playback output interface.

7.4.7 SPEAKER -- optional

The SPEAKER interface on the main connector of the product can be connected to the car audio and provide a driving amplifier, and can output differential audio signals externally as a call output interface.

7.4.8 CAN

The CAN interface on the main connector of the product provides three-way high-speed CAN. The CAN rate is defined by the user but must comply with the relevant CAN 2.0B specifications.

7.4.9 KEY -- optional

The BCALL\ECALL interface on the main connector of the product can provide the connection for externally initiated ECALL\BCALL business of the product. The interface is internally pulled up, and the normal state is high level, and the pull down triggers the service. The product also provides BCALL\ECALL button drop detection and BCALL\ECALL button status indicator.

7.4.10 SRS -- optional

The SRS interface on the main connector of the product can provide the vehicle airbag signal connection. The interface is internally pulled up, and the normal state is a high level, which triggers the airbag alarm according to customer needs.

7.4.11 Ethernet -- optional

The Ethernet interface on the main connector of the product can provide an Ethernet connection that supports 100BASE-T1. It is used for data transmission between the product and various units in the vehicle.

7.4.12 USB

The USB interface on the product's HSD connector provides an external connection with the product's internal entertainment system coprocessor, which can be used for product firmware upgrades and other data transmissions. The interface conforms to the USB 2.0 specification and supports USB 2.0 full-speed and high-speed modes.

7.4.13 4G (WAN)

The product's 4G signal Fakra connector provides additional 4G antenna connection, and the product also provides external antenna drop-off detection.

7.4.14 GNSS

The product's GNSS signal Fakra connector provides external GNSS active antenna connection, and the product also provides external antenna dropout and short circuit detection.

8. Electric Properties

8.1 Absolute maximum rated parameter

Parameter	Minimum	Maximum	Unit
VBAT	-0.5	36	V
ACC	-0.5	36	V
USB pin input voltage	-0.5	5.25	V
Other signal pin input voltage	-0.5	14	V
Operating ambient temperature (business)	-40	+85	°C
Operating ambient temperature (entertainment)	-20	+70	°C
Storage temperature range	-40	+85	°C
ESD stress voltage	air	± 15	KV
	touch	± 8	

Table12: Absolute maximum rated parameter

8.2 Recommended working conditions

Parameter	Condition	Minimum	typical value	Maximum	Unit
VBAT	The DC power supply range is suitable for all modes.	9	14	16	V
ACC		9	14	16	V
IO High-level input voltage	RS485	3	3.3	3.6	V
	CAN HS	Comply with the CAN 2.0B specification			V
	CAN LS	Comply with the CAN 2.0B specification			V
	USB	Comply with the USB 2.0B specification			V
IO Low-level input voltage	RS485	0	-	0.6	V
	CAN HS	Comply with the CAN 2.0B specification			V
	CAN LS	Comply with the CAN 2.0B specification			V
	USB	Comply with the USB 2.0B specification			V
IO High-level output voltage	ECALL\BCALL KEY	3	3.3	3.6	V
	ECALL\BCALL LED	3.8	4.0	4.2	V
	SRS	8	-	8.6	V
	RS485	3	3.3	3.6	V
	CAN HS	Comply with the CAN 2.0B specification			V
	CAN LS	Comply with the CAN 2.0B specification			V
	USB	Comply with the USB 2.0B specification			V
IO Low-level output voltage	ECALL\BCALL KEY	0	-	0.6	V
	ECALL\BCALL LED	0	-	0.6	V
	SRS	0	-	0.6	V
	RS485	0	-	0.6	V
	CAN HS	Comply with the CAN 2.0B specification			V
	CAN LS	Comply with the CAN 2.0B specification			V

IO Low-level output voltage	USB	Comply with the USB 2.0B specification			V
Signal slope	CAN HS	Comply with the CAN 2.0B specification			V/ns
Signal slope	CAN LS	Comply with the CAN 2.0B specification			V/ns
Operating environment temperature	business	-40	-	85	°C
	entertainment	-20	-	70	°C
maximum power dissipation	-	-	15	-	W

Chart 13: Recommended working conditions

9. Ordering Information

9.1 Product packaging information

TBD

9.2 Order information

Order Number
FLC-WNP296

Table14: Order information

FCC Statement

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

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

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

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