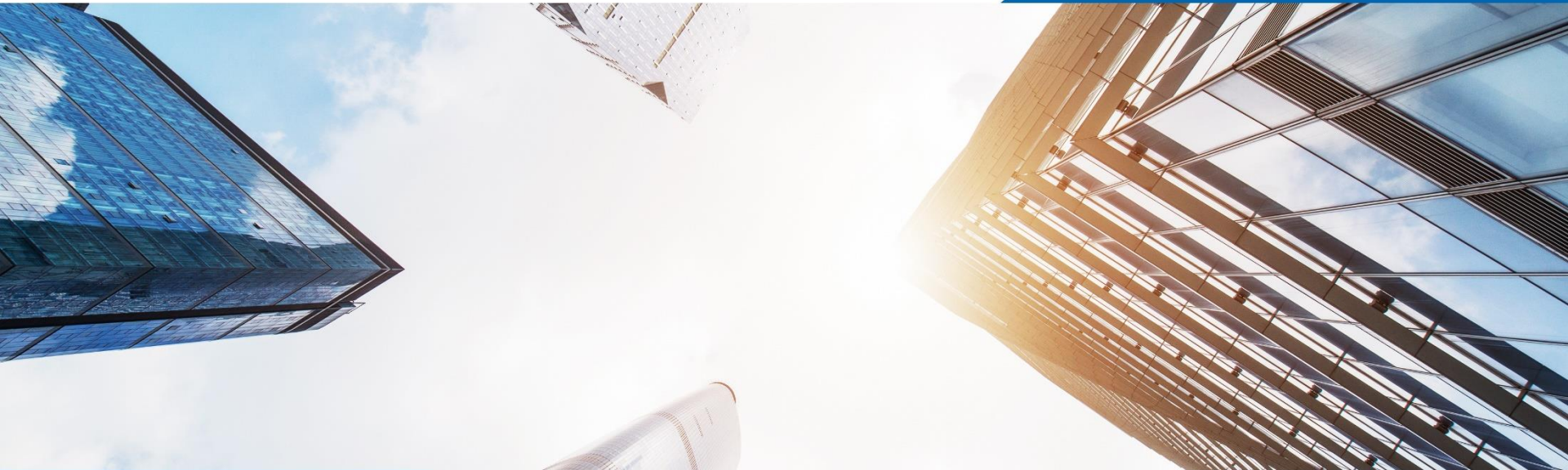




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**KX11 Network system**

# Contents

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## ▶ Network System Topology

Maintenance and Diagnosis

# Network System Topology



The network of KX11 is developed based on GEEA 2.0 electrical and electronic architecture.

➤ Domain Distributed Network Architecture

**4 domains:** Vehicle Dynamics Domain, Active Safety Domain, Central Electronic Domain & Infotainment Head Domain;  
**4 domain control modules:** VDDM, ASDM, IHU, CEM.

4 Domains communicates with each other through **FlexRay**.

➤ Communicate Rate Parameters:

FlexRay: 10M bit/s , single channel

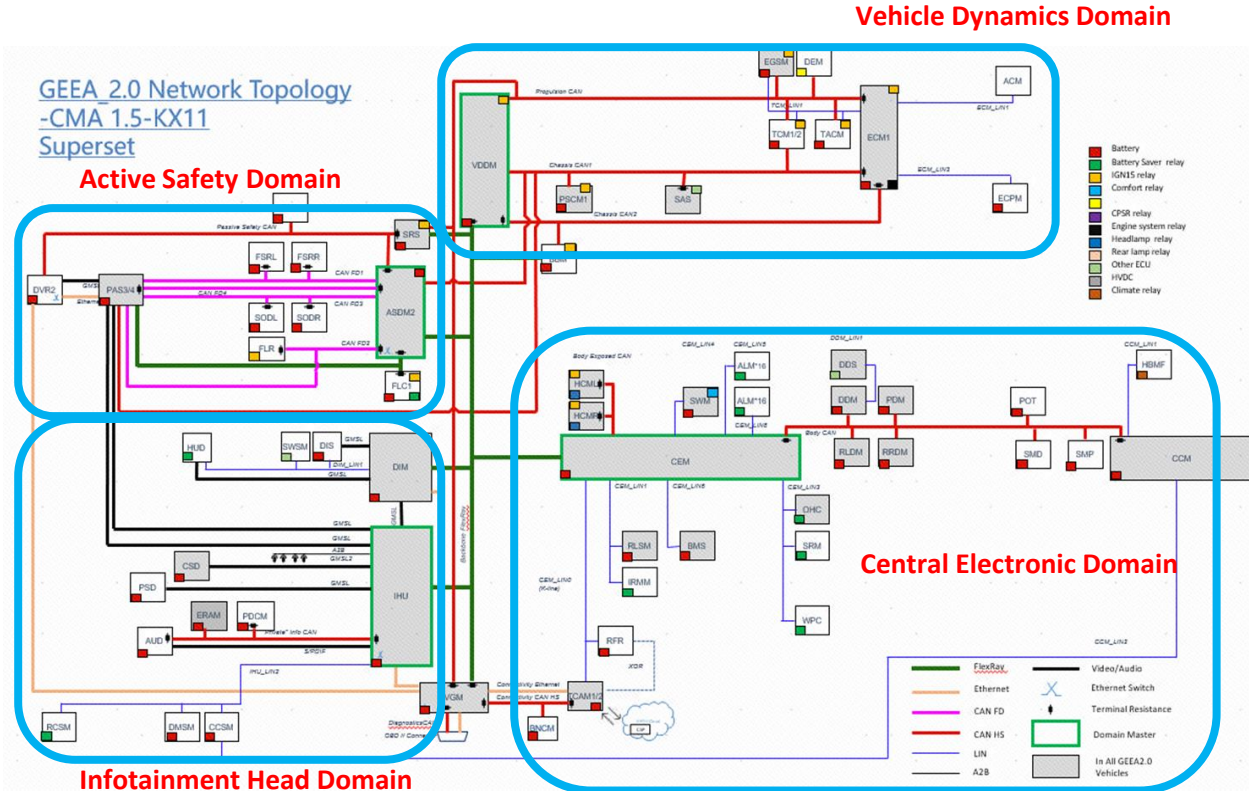
CAN: 500K bit/s

CAN FD: 2M bit/s

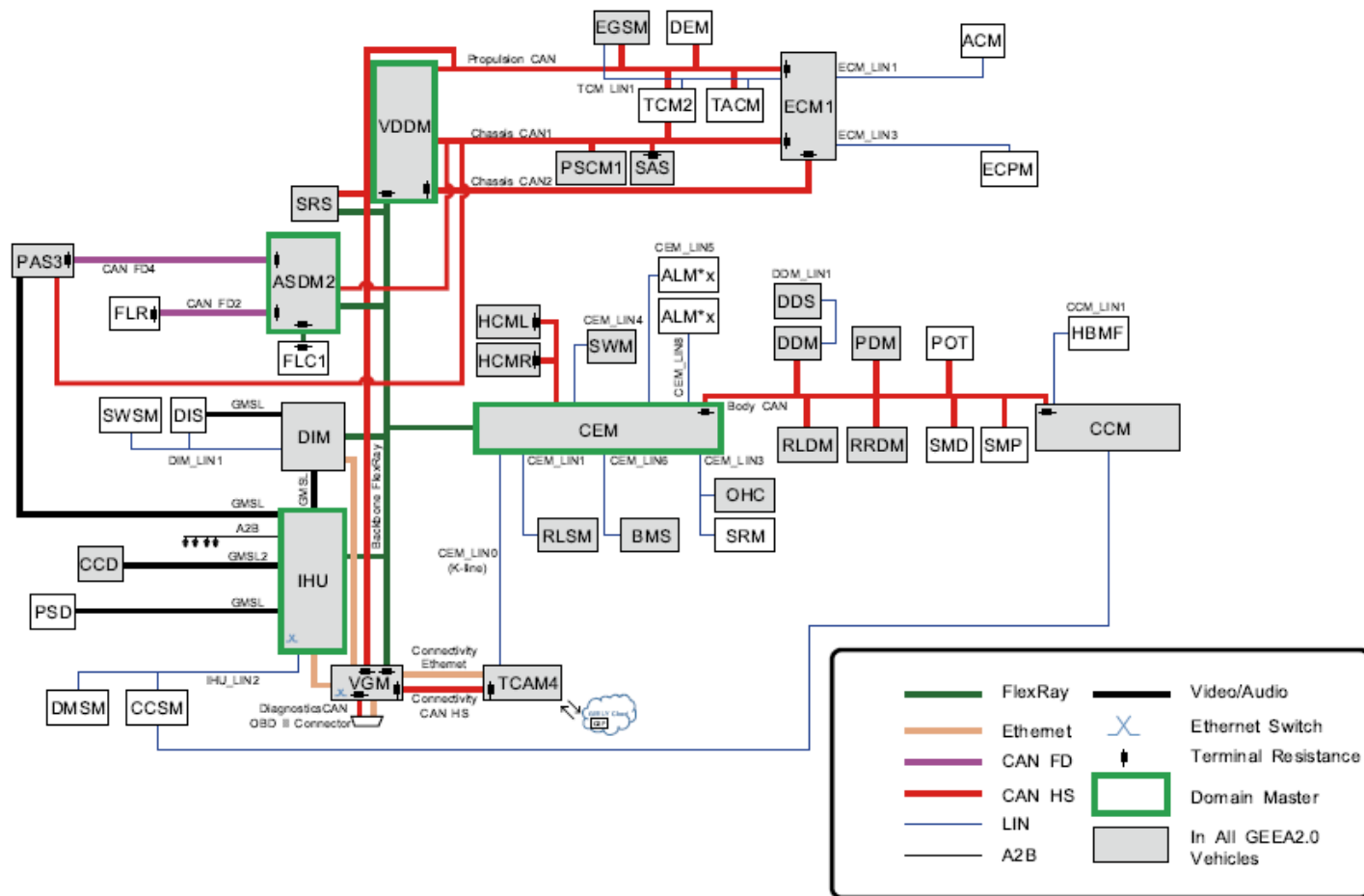
LIN: 19.2K bit/s

**Note:**

For different configurations, not all these control modules are available.



# Network System Topology





# Abbreviation of control module



序号	控制器	英文名称	中文名称
1	ACM	Alternator Control Module	智能发电机
2	ALM	Ambient Lights Control	氛围灯控制器
3	ASDM	Active Safety Domain Master	主动安全域控制器
4	AUD	Audio Module	汽车音响功放
5	BBM	Brake Booster Module	制动助力器模块
6	BMS	Battery Monitoring Sensor	蓄电池监测传感器
7	BNCM	Bluetooth NFC Communication Module	蓝牙NFC通讯模块
8	CCM	Climate Control Module	空调控制器
9	CCSM	Center Console Switch Module	中控开关模块
10	CEM	Central Electronic Module	车身域控制器
11	CSD	Center Stack Display	车载信息娱乐显示屏
12	DDM	Driver Door Module	驾驶员侧门模块
13	DDS	Driver Door Switch	驾驶员侧门开关
14	DEM	Differential Electronic Module	电子差速器模块
15	DIM	Driver Information Module	驾驶信息模块
16	DIS	Driver Information Screen module	驾驶信息显示屏
17	DMSM	Drive Mode Switch Module	驾驶模式开关
18	DVR	Digital Video Recorder	行车记录仪控制器
19	ECM	Engine Control Module	发动机控制器
20	ECPM	Engine Coolant Pump Module	发动机冷却泵
21	EGSM	Electronic Gear Selector Module	电子换挡器
22	ERAM	Emergency Rescue Assistance Module	紧急救援辅助模块
23	FLC	Front Looking Camera	前视摄像头
24	FLR	Forward Looking Radar	前视毫米波雷达
25	FSRL	Front Side Radar Left	左前侧雷达
26	FSRR	Front Side Radar Right	右前侧雷达
27	HBMF	HVAC Blower Module Front	前空调鼓风机
28	HCML	Headlight Control Module Left	左前大灯控制器
29	HCMR	Headlight Control Module Right	右前大灯控制器
30	HUD	Head Up Display	抬头显示
31	IHU	Infotainment Head Unit	车载信息娱乐主机

序号	控制器	英文名称	中文名称
32	IRMM	Interior Rear view Mirror Module	内后视镜模块
33	OHC	Overhead Console	顶灯模块
34	PAS	Parking Assist System	泊车辅助系统控制器
35	PDCM	Parking Distance Control Module	泊车距离控制模块
36	PDM	Passenger Door Module	副驾驶侧门模块
37	POT	Power Operated Tailgate	电动后备箱门模块
38	PSCM	Power Steering Control Module	电动转向控制模块
39	PSD	Passenger side display	副驾屏模块
40	RCSM	Rear Console Switch Module	后开关控制模块
41	RFK	Remote Key Fob (PCBA)	遥控钥匙
42	RFR	Radio frequency receiver	射频接收模块
43	RLDM	Rear Left Door Module	左后侧门模块
44	RLSM	Rain and Light Sensor Module	阳光雨量传感器
45	RML	Restraint Module Left	左电动安全带控制模块
46	RRDM	Rear Right Door Module	右后侧门模块
47	SAS	Steering Angle Sensor	转向角传感器
48	SMB	Seat Module Back	后座椅控制器
49	SMD	Seat Module Driver	驾驶员座椅控制器
50	SMP	Seat Module Passenger	副驾驶座椅控制器
51	SODL	Side Obstacle Detection Left	左后侧雷达
52	SODR	Side Obstacle Detection Right	右后侧雷达
53	SRM	Sun Roof Module	天窗模块
54	SRS	Supplementary Restraint System	约束系统控制器
55	SWM	Steering Wheel Module	组合开关
56	SWSM	Steering Wheel Switch Module	多功能方向盘开关
57	TACM	Transmission Actuator Control Module	变速箱执行器控制模块
58	TCAM	Telematics & Connectivity Antenna Module	车联网智能天线模块
59	TCM	Transmission Control Module	变速器控制器
60	VDDM	Vehicle Dynamics Domain Master	动态行驶域控制器
61	VGM	Vehicle Gateway Module	网关
62	WPC	Wireless Phone Charger	手机无线充电



## What's FlexRay

FlexRay is a new communication system, which aims to realize a real-time reliable and efficient data transmission between electrical and mechanical components. The network bandwidth of FlexRay is 10M bit/s, significantly higher than the CAN bus of 0.5M bit/s.

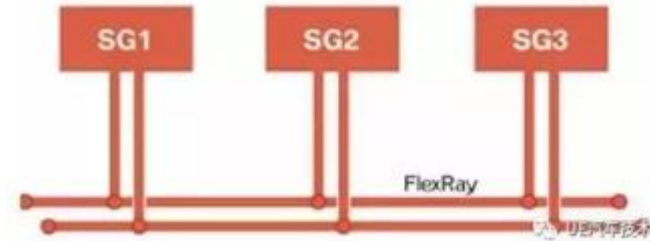
## Bus Topology

FlexRay can use the following topologies:

- Linear topology
- Star topology
- Hybrid topology (linear and star)

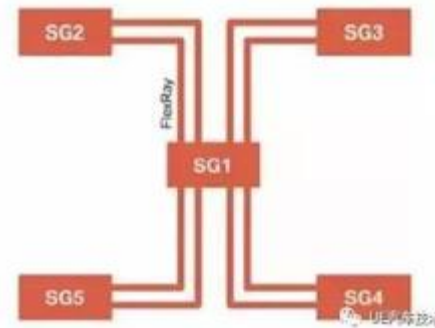
## Linear topology

Just like CAN bus, all control units are connected with twisted pair in parallel, there are no distinction of primary or secondary.



## Star topology

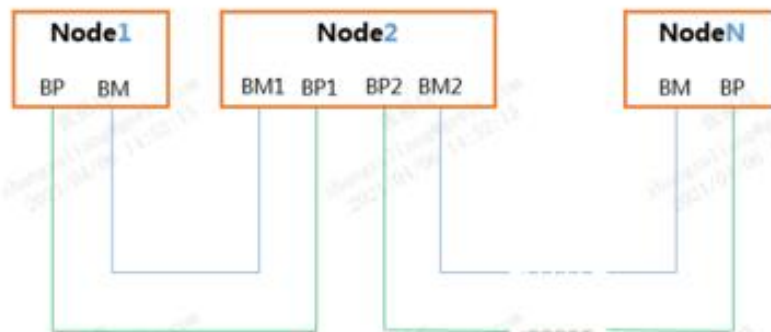
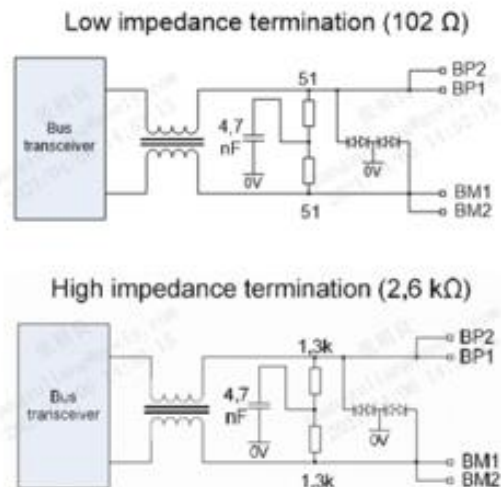
There are central control unit and satellite control unit, all satellite control units are connected with the central control unit.





## FlexRay physical layer

- GEEA 2.0 FlexRay adopts bus type structure, connected by twisted pair;
- Adopts daisy chain topology
- Terminating resistance for terminal nodes are  $102\ \Omega$  (BP to BM)
- terminating resistance for non-terminal nodes are  $2.6\text{K}\ \Omega$  (BP to BM)



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Overview

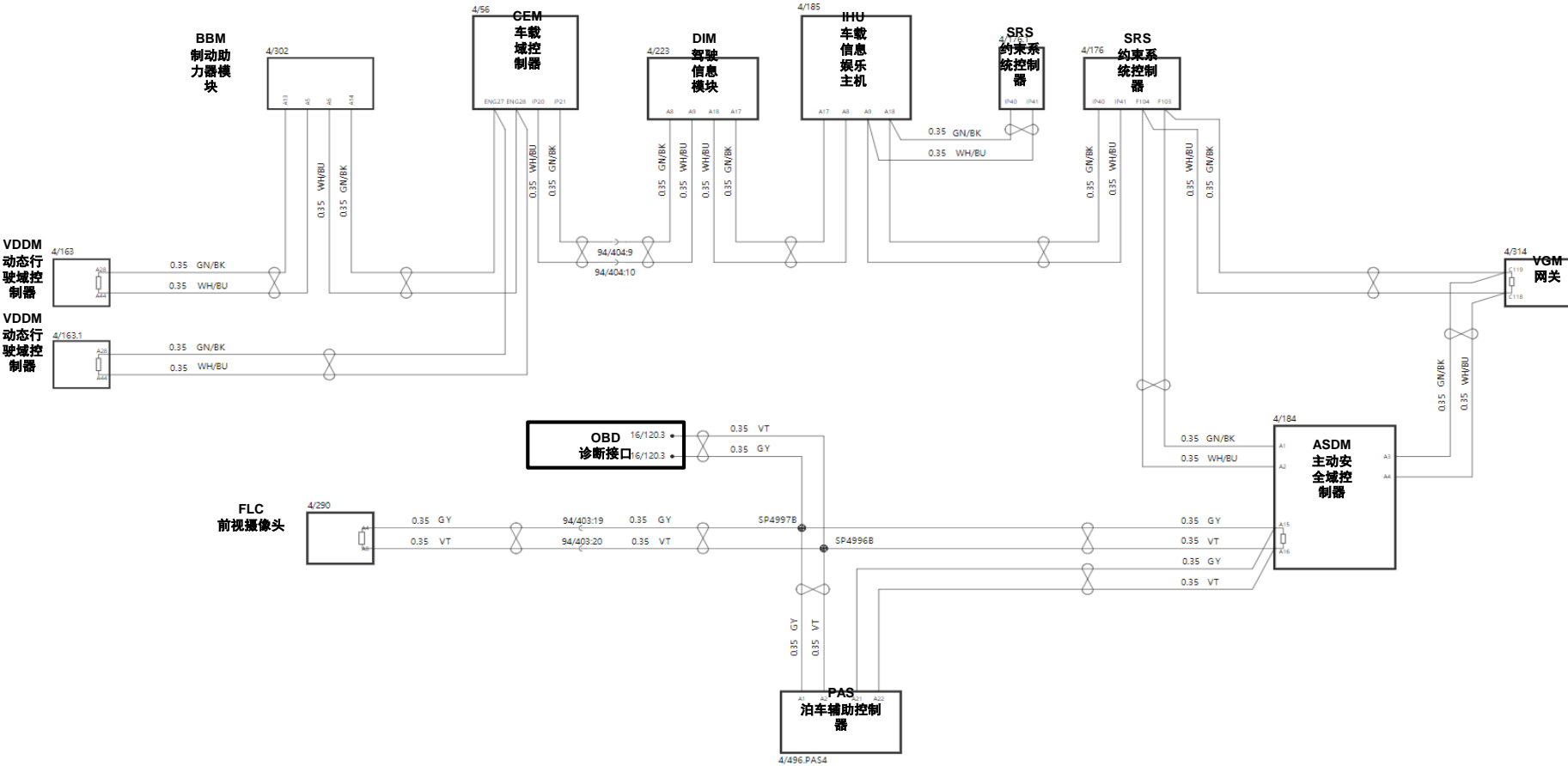
Network System Topology

► **Maintenance and diagnosis**





# FlexRay Wiring Diagram





## FlexRay

- **Measuring resistance**

Terminating resistance for terminal nodes are  $102\ \Omega$  (BP to BM), normally the measured resistance value are between  $90\ \Omega$  to  $110\ \Omega$ , If measured in parallel, it's between  $45\ \Omega$  to  $55\ \Omega$ .

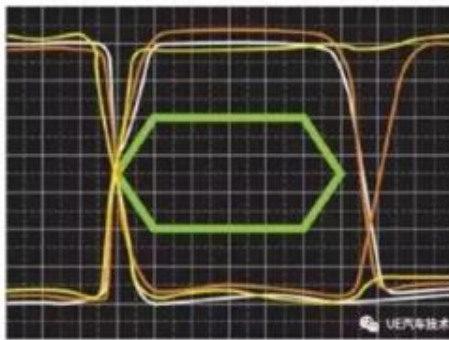
- **Measuring voltage**

Normally, the voltage of FlexRay-H is about  $2.6\text{V}$  and FlexRay-L is about  $2.4\text{V}$ . If the measured voltage value is  $0$  or  $12\text{V}$ , which indicates it shorted to the ground or power supply.

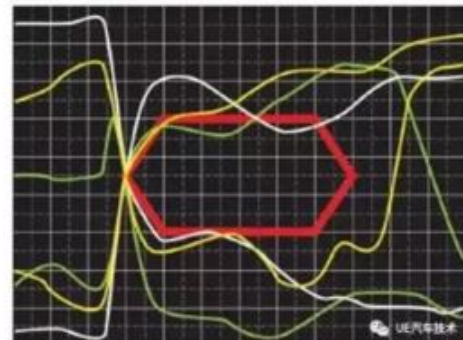
- **Measuring by oscilloscope**

Disadvantage : A dedicated oscilloscope is required, and the wiring connecting is complicated.

The waveform of FlexRay is similar to the CAN bus.



Normal

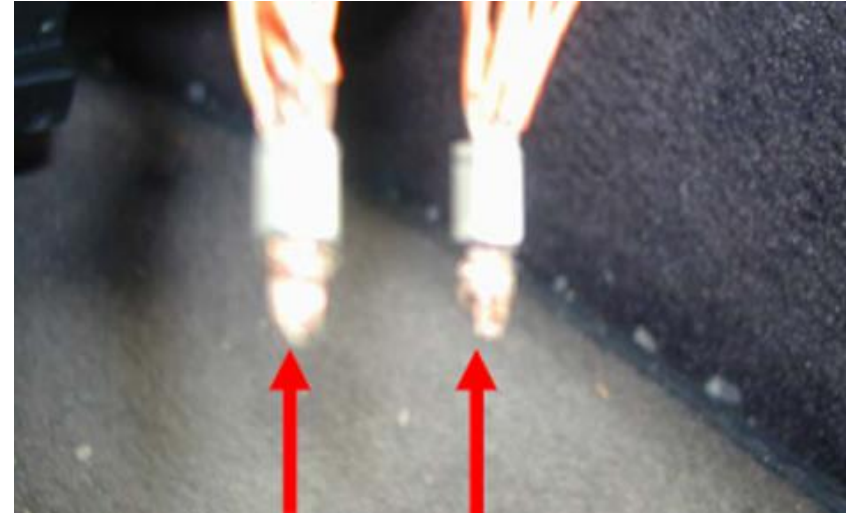
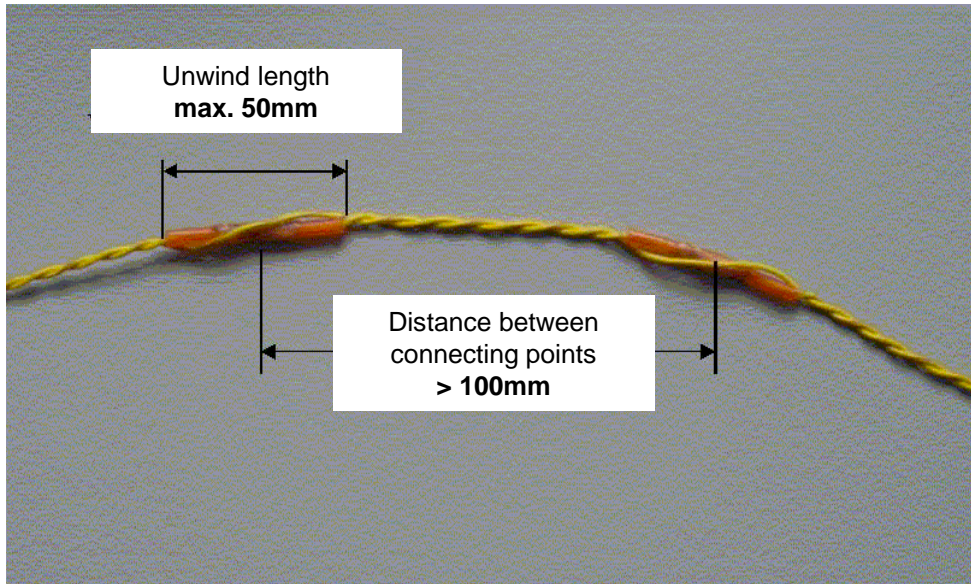


Abnormal  
(there are some interference)



## CAN Bus

1. Under normal circumstances, the CAN-H voltage to the ground is measured to be 2.5-3.5V by multimeter, generally between 2.6 to 2.8V; CAN-L ground voltage is 1.5 to 2.5V, generally between 2.2 and 2.4V;
2. When the CAN-L is disconnected, the voltage of CAN-L is higher than 2.5V and the system can communicate and work; when the CAN-H is disconnected, the voltage of CAN-H is lower than 2.5V and the system cannot communicate and does not work;
3. When CAN-L is short-circuited to power supply, the voltage of CAN-L is equal to battery voltage, and the voltage of CAN-H is 1.5V lower than that of CAN-L; when CAN-H is short-circuited to power supply, the voltage of CAN-H is equal to battery voltage, and the voltage of CAN-L is 1.5V lower than that of CAN-H; system can not communicate and does not work;
4. When CAN-L is short-circuited to ground, CAN-L voltage is 0V, CAN-H voltage is lower than 0.55V (minimum operating voltage range), the system can communicate and can work normally; when CAN-H is short-circuited to ground, CAN-H and CAN-L voltages are both 0V; the system cannot communicate and does not work;
5. When CAN-H and CAN-L are short-circuited, both CAN-H and CAN-L voltages are 2.5V; the system cannot communicate and does not work;
6. When CAN-H and CAN-L are reversed, CAN-H voltage is lower than 2.5V, and CAN-L voltage is higher than 2.5V;
7. When the CAN-H and CAN-L are disconnected, the node cannot communicate;
8. When the termination resistor is disconnected, the CAN-BUS system cannot work normally.



The node shown by the red arrow must not be opened



VIN: LB37852D2MS006189

Model/Year/Chassis: KX11, 2021, 006189

Connection: Virtual #1

12.1 V Active

Network

Fault Tracing

Components

Service Functions

Source 3/22/2022 1:08:46 PM

ECUs Other

ID	Name
	VGM
4/314	Vehicle Gateway Module (VGM)

Documents

Wiring Diagrams

Parameters

Activations

Diagnostic Sequences

Parameters Selected

Parameter

- Global real time - VGM
- Supply voltage to CEM (reference voltage) - VGM
- Supply voltage to control module - VGM
- Total distance - VGM
- Usage mode - VGM

### Supply voltage to CEM (reference voltage) - VGM

#### Parameter usage:

The parameter shows the supply voltage to the Central Electronic Module (CEM). This is used as a reference for other control modules to determine if their supply voltage is low compared to the Central Electronic Module (CEM), as well as inactivating functions such as start/stop during low battery voltage.

#### Parameter origin:

The parameter value originates from the power supply input to the Central Electronic Module





# 快乐人生 吉利相伴

1760, Jiangling Road, Binjiang District, Hangzhou,  
Zhejiang Province, P, R.China, 310051

[www.geely.com](http://www.geely.com)

No.918,Binhai 4th Rd. Hangzhou Bay New District,

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