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MIH EVKit Technical Specification

MIH

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1. General Information

1.1. Purpose

EVKit is an open vehicle platform (skateboard) for electric vehicles that utilizes an open communication protocol to provide Autonomous Driving developers a development tool to assist with the confirmation and validation of their designs. EVKit aims to solve the current bottleneck in the development of autonomous cars, and to revolutionize the traditional closed sourced operating system methodology of the automotive industry.

EVKit uses drive-by-wire technology (hereinafter referred to as DBW) to control the essential dynamics of the platform with open specifications and controllable parameters. This provides Autonomous Driving ecosystem partners the method to perform their system development and design. Thus, the following article will be focused on the specifications and control guidelines of the platform, offering Autonomous Driving system developers a starting point for their work.

1.2. Disclaimer

The company's responsibilities for the products and services it provides are entirely based on the contract when the products and/or services are purchased, and no content from any other sources should be interpreted as a modification of such contracts.

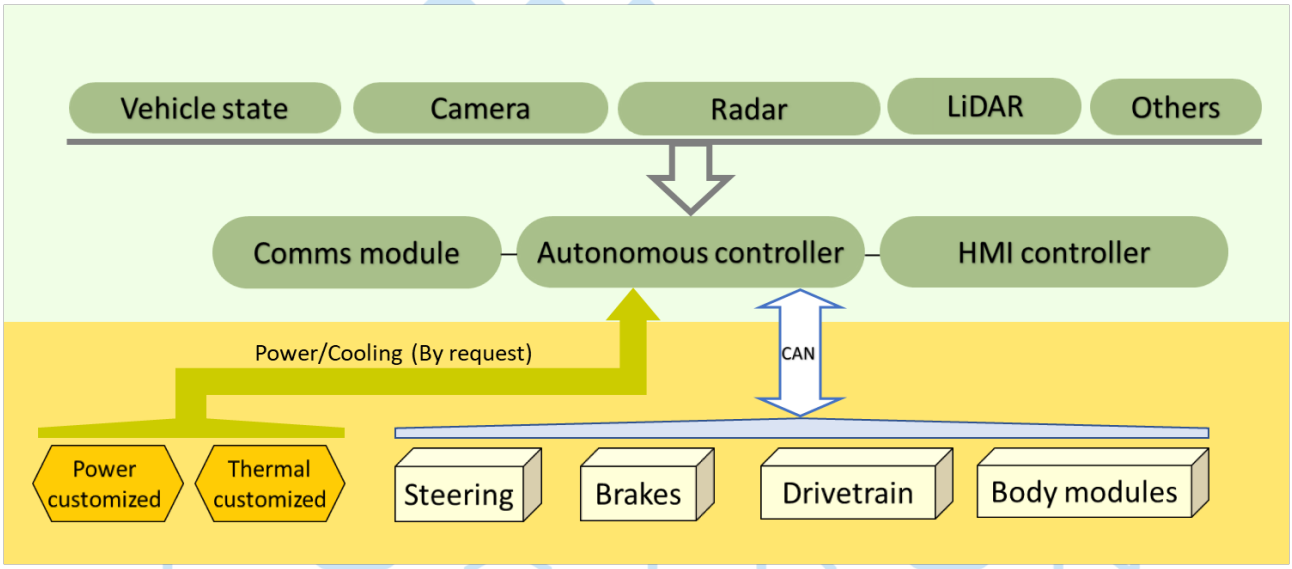
Due to the complexity, difficulty, and safety requirements that are involved in operating the EVKit, it cannot be provided with any form of guarantee to suit customer's activities, which includes but not limited to marketability, suitability for any particular purpose, or non-infringement of intellectual property laws, and for the correctness and objectivities of the information provided.

For any related inquiries please contact our business unit.

2. Architecture

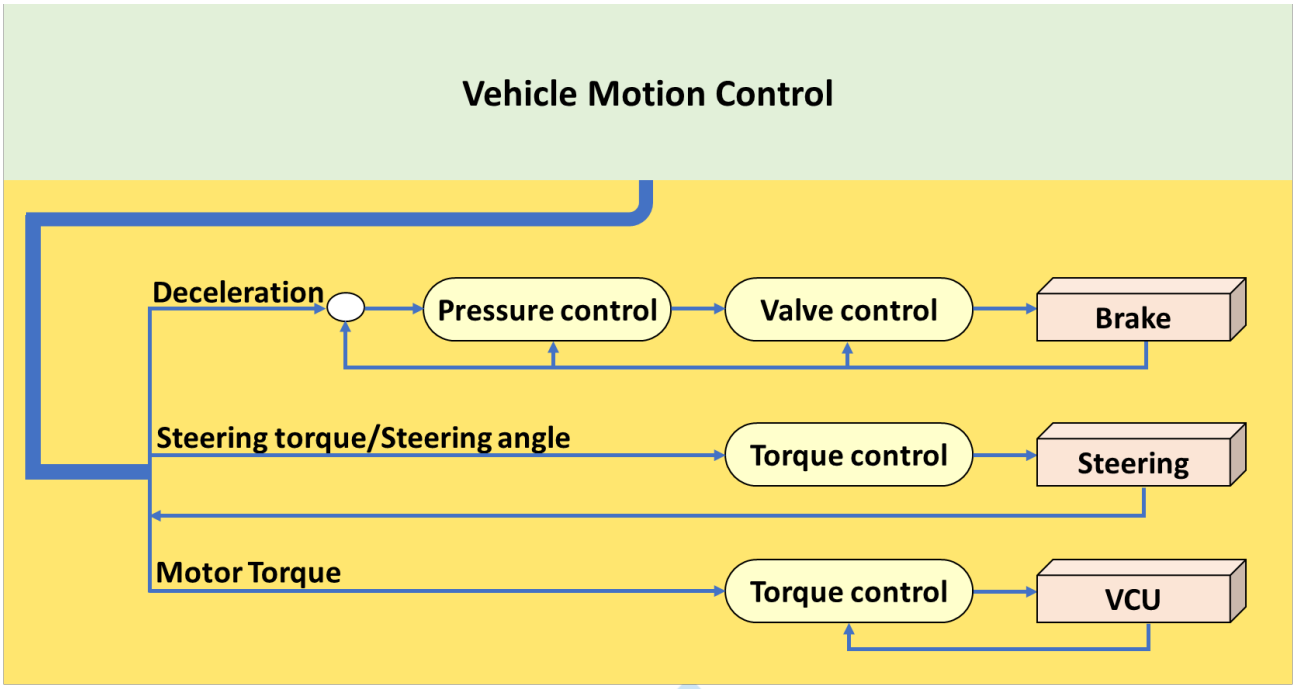
2.1. Autonomous Driving system

The Autonomous Driving architecture can be mainly divided into two parts. The first part is the "sensors and decision-making system", that utilizes the information collected from the Autonomous controller, HMI and communication modules with the sensors such as cameras, radars, LiDAR, and vehicles states (IMU, GNSS) to make the calculation and actional decisions. The second part is a wire-controlled hardware, which receives the commands from the "sensors and decision-making system" to perform braking, steering and acceleration/deceleration actions. Combining both and mastering the dynamic relationship of the decision-making system and the wire-controlled components is essential to realize Autonomous Driving function.



2.2. Platform motion control

After raw sensor data are processed by the "Autonomous Driving system" and control signal are sent to the wire-control system, as illustrated in the schematic below, different dynamic controllers will require different input signals and control sequences to operate as intended. More details will be explained later in section 3.3.



3. Technical Specification

3.1. Vehicle General Information

Dimensions	Length * Width * Height (mm)	4410*1785*1605
	Wheelbase (mm)	2650
	Front / Rear Tread (mm)	1505/1520
	Weight (kg)	1625~1645
Motor and Battery	Motor type	Permanent-magnet synchronous motor
	MCU	MCU max. current 525(A) MCU max. operating voltage 400(V)
	Maximum Torque (N-m)	250
	Maximum Power (kW)	130
	Transmission	Fixed gear ratio 1:9.07
	Maximum rotating speed (rpm)	12000
	Battery type	Ternary lithium battery
	Battery pack (Ah)	153
	Range (km)	360
	Energy (kWh)	50
	Fast charge time 20%~80% (min.) Slow charge time 0%~90% (min.)	48 408
Suspensions, Brakes, and Steering	Drive type	Front Wheel Drive
	Front Suspension	MacPherson
	Rear Suspension	Twist Beam
	Front / Rear Brakes	Disc
	Tire Size	215/55 R17
	Turning circle (m)	5.7
Technologies	B-Paddle (One Paddle Drive)	●
	PRND Shift by Wire	●
	IVI screen size (inch)	12
	HUD display	●
	ABS, EBD, Brake assistance, Energy recuperation system, EPB	●

3.2. Platform motion control specifications

3.2.1. Braking

▪ Brake type	▪ Hydraulic actuator
▪ Capable of setting	▪ YES
▪ Performance	▪ 1.1G (wheel lock ABS active) ▪ ≤670ms to wheel lock ▪ 100ms response time command to deceleration ▪ ≤10% steady-state tracking error
▪ Commands	▪ 10ms ▪ Vehicle deceleration ▪ Emergency braking
▪ Feedback	▪ 10ms ▪ 4 wheel speeds ▪ Long/lat accel, yaw rate

3.2.2. Steering

▪ Steering type	▪ Front rack ▪ Electro-Mechanical
▪ Capable of setting	▪ YES
▪ Performance	▪ ≥ 30° road wheel angle in front ▪ 1% steady-state tracking error
▪ Commands	▪ 10ms ▪ Steering torque (full speed for ADAS) ▪ Steering angle (≤ 10kph for APS) ▪ ECU state/mode
▪ Feedback	▪ 10ms/20ms ▪ Hand wheel angle and torque ▪ Control capacity (to ADAS)

	▪ ECU faults

3.2.3. Drivetrain

▪ Drivetrain type	▪ Independent front ▪ Electric motor through gearbox, open differential
▪ Capable of setting	▪ YES
▪ Performance	▪ ≤ 150 kph speed ▪ Wheel side torque 2267Nm ▪ ≤ 500ms for response time, command to wheel torque ▪ ≤ 5% steady-state tracking error
▪ Commands	▪ 10ms ▪ Wheel torque ▪ ECU desired state/mode
▪ Feedback	▪ 10ms ▪ Max. motoring/ regen torque ▪ Pack SOC

3.3. DBW hardware control interface guidelines

The hardware interface of EVKit development platform reserves power supply and signal wiring harness to connect to external devices, while a 120 Ohm terminal resistor is required between the vehicle and the connecting hardware. The wiring harness is defined in the following table.

PIN	Description	Wire diameter	Color
01	B+	0.3	R
02	GND	0.3	B
03	IGN	0.3	R-G
04	Reserved for wiring	0.3	G

05	CANA_H	0.3	L
06	CANA_L	0.3	P

Connector specifications: HA06MW and HA06FW.

EVKit controllable units include VCU (Gearing and powertrain), ESC (brake), EPS (steering) and BCM (body controller). The communication protocol and control methods of each control unit are as described the following paragraphs.

Unit abbreviation	Full name and explanation	Control function
ACU	Autonomous Control Unit	Autonomous drive controller, sending control commands
VCU	Vehicle Control Unit	Gearing, motor torque output
ESC	Electronic Stability Control	Brakes
EPS	Electric Power Steering	Steering
BCM	Body Control Module	Body components such as doors and lights

Autonomous drive controller and signal confirmation

The related signals are shown in the following table:

Signal Identification	Description	Usage	Direction
ADAS1_LifeCount	Rolling Counter of ADAS1	To confirm the stability and correctness of ADAS1 signal	Tx
APS_Roll_Count	Indicate the message transmission sequence of steering wheel angle	To confirm the stability and correctness of APS signal	Tx
SAS_MsgCount	Number of the Message	To confirm the stability and correctness of SAS signal	Rx
EPAS3_LifeCount	Rolling Counter of EPAS3	To confirm the stability and correctness of EPS signal	Rx
VehSpeed_LifeCount	Vehicle Speed Life Counter	To confirm the stability and correctness of vehicle speed signal	Rx
WhlSpeed_LifeCount	Wheel Speed Life Counter	To confirm the stability and correctness of Wheel speed signal	Rx
F_Whl_P_LifeCount	Front Wheel Pulse Life Counter	To confirm the stability and correctness of the front wheel speed pulse signal	Rx
R_Whl_P_LifeCount	Rear Wheel Pulse Life Counter	To confirm the stability and correctness of the rear wheel speed pulse signal	Rx

3.3.1. Braking

ESC relevant signals are shown in the table below:

Signal Identification	Description	Direction
ADAS_DecReq	Vehicle Deceleration Request	Tx
ADAS_DecReq_A	Vehicle Deceleration Request Applicable	Tx
ADAS_AEBReq	AEB Request	Tx
ADAS_AEBReq_A	AEB Request Applicable	Tx
LongAccel	Longitudinal Acceleration	Rx
LongAccel_V	Longitudinal Acceleration Validity	Rx
LatAccel	Lateral Acceleration	Rx
LatAccel_V	Lat Acceleration Validity	Rx
YawRate	Yaw Rate	Rx
YawRate_V	Yaw Rate Validity	Rx
BrkSw_Sta	Brake switch signal status	Rx
BrkSw_V	Brake switch signal Valid	Rx
GRADE	Surface Grade	Rx
GRADE_V	Surface Grade Validity	Rx
Booster_Vacuum	Booster Vacuum Level Relative to Ambient	Rx
BoosterVacuumFail	Booster Vacuum Level Diagnosis	Rx
MCPressure	Master Cylinder Pressure	Rx
MCPressure_V	Master Cylinder Pressure Validity	Rx
PBA_Active	Panic Brake Assist Active	Rx
PBA_Failed	Panic Brake Assist Failed	Rx
ABS_Active	Antilock Brake System Active	Rx
ABS_Failed	Antilock Brake System Failed	Rx
EBD_Active	Electronic Brake force Distribution Active	Rx
EBD_Failed	EBD System Failed	Rx
RR_RawWhlSpeedLR	Right Rear Raw Wheel Speed Low Resolution	Rx
RR_RawWhlSpeedLR_V	Right Rear Raw Wheel Speed Low Resolution Valid	Rx
LR_RawWhlSpeedLR	Left Rear Raw Wheel Speed Low Resolution	Rx
LR_RawWhlSpeedLR_V	Left Rear Raw Wheel Speed Low Resolution Valid	Rx
RF_RawWhlSpeedLR	Right Front Raw Wheel Speed Low Resolution	Rx
RF_RawWhlSpeedLR_V	Right Front Raw Wheel Speed Low Resolution Valid	Rx

LF_RawWhlSpeedLR	Left Front Raw Wheel Speed Low Resolution	Rx
LF_RawWhlSpeedLR_V	Left Front Raw Wheel Speed Low Resolution Valid	Rx
RF_Whl_PC	Right Front Wheel Pulse Counter	Rx
RF_Whl_R_Dir	Right Front Wheel Rotation Direction	Rx
RF_Whl_PC_Validity	Right Front Wheel Pulse Counter Validity	Rx
LF_Whl_PC	Left Front Wheel Pulse Counter	Rx
LF_Whl_R_Dir	Left Front Wheel Rotation Direction	Rx
LF_Whl_PC_Validity	Left Front Wheel Pulse Counter Validity	Rx
RR_Whl_PC	Right Rear Wheel Pulse Counter	Rx
RR_Whl_R_Dir	Right Rear Wheel Rotation Direction	Rx
RR_Whl_PC_Validity	Right Rear Wheel Pulse Counter Validity	Rx
LR_Whl_PC	Left Rear Wheel Pulse Counter	Rx
LR_Whl_R_Dir	Left Rear Wheel Rotation Direction	Rx
LR_Whl_PC_Validity	Left Rear Wheel Pulse Counter Validity	Rx

The ESC brake control is divided into AEB control and deceleration control mode. When the ESC receives the AEB control command, it will brake with the maximum clamping force (about 1.0 G = 9.8 m/s2); when the ESC receives the deceleration control, it will operate according to the requested deceleration.

- The ESC brake control has no starting conditions. It will act as long as it meets the requirements of the control command. Therefore, special care must be taken for the use of this function (not to be trigger by mistake).

1. AEB controlling method :

ADAS_AEBReq_A is the protection signal, sending ADAS_AEBReq = 1 and ADAS_AEBReq_A = 1 will trigger AEB function.

2. Deceleration control method :

ADAS_DecReq_A is the protection signal, sending ADAS_DecReq_A = 1 and ADAS_DecReq = 0 ~ 10 m/s2 (value between 0~10, where 10=1.0G), will activate deceleration control.

3.3.2. Steering

EPS steering control is divided into angle control and torque control status, which cannot be executed at the same time, details are explained below.

1. EPS steering angle control:

EPS steering angle control is applicable for vehicle speeds below 10km/h, related signals are shown in the table below:

Signal identification	Description	Direction
APS_V_Rq_EPAS_Ctrl	to indicate if the signal request active is valid or not	Tx
APS_Rq_EPAS_Ctrl	This signal is used when the APA need to control the steering wheel	Tx
APS_Angle_Target	to indicate the target steering angle	Tx
VehSpeed	Vehicle Speed	Rx
EPS_I_Detect	Driver steering interference detected	Rx
EPS_VD_I_Detect	Driver steering interference detected validity	Rx
SAS_Angle	Absolute steering wheel angle	Rx
SAS_OK	Absolute steering wheel angle validity	Rx
SAS_CAL	SAS calibrated	Rx
EPS_Sta_Available	Electrical power steering availability status for APA	Rx
EpasFailed	EPS Failed	Rx

The conditions for EPS enter angle control status :

- EpasFailed = 0 (No Failure)
- VehSpeed <= 1 kph
- EPS_I_Detect = 0 (False, no interruption)
- SAS_OK = 1 (Valid)
- APA_V_Rq_EPS_Ctrl = 1 (Valid)
- -385 deg < APA_Angle_Target < 385 deg

- SAS_Angle and APA_Angle_Target value < 8 deg

When the above conditions are met, send the following signals : APA_Rq_EPS_Ctrl = 1 (Request to Control EPS), EPS will then switch to angel controlled status EPS_Sta_Available = 2 (Controlled), at this time using APS_Angle_Target = -385 ~ 385 deg will be able to control the steering angle.

The conditions for EPS to leave angle control status :

- VehSpeed > 10 kph
- Steering_Torque > 3 Nm
- APA_V_Rq_EPS_Ctrl = 0 (Invalid)
- Absolute value of APA_Angle_Target > 385 deg
- SAS_Angle and APA_Angle_Target value is > 100 deg
- APA_Rq_EPS_Ctrl = 0 (No Request)

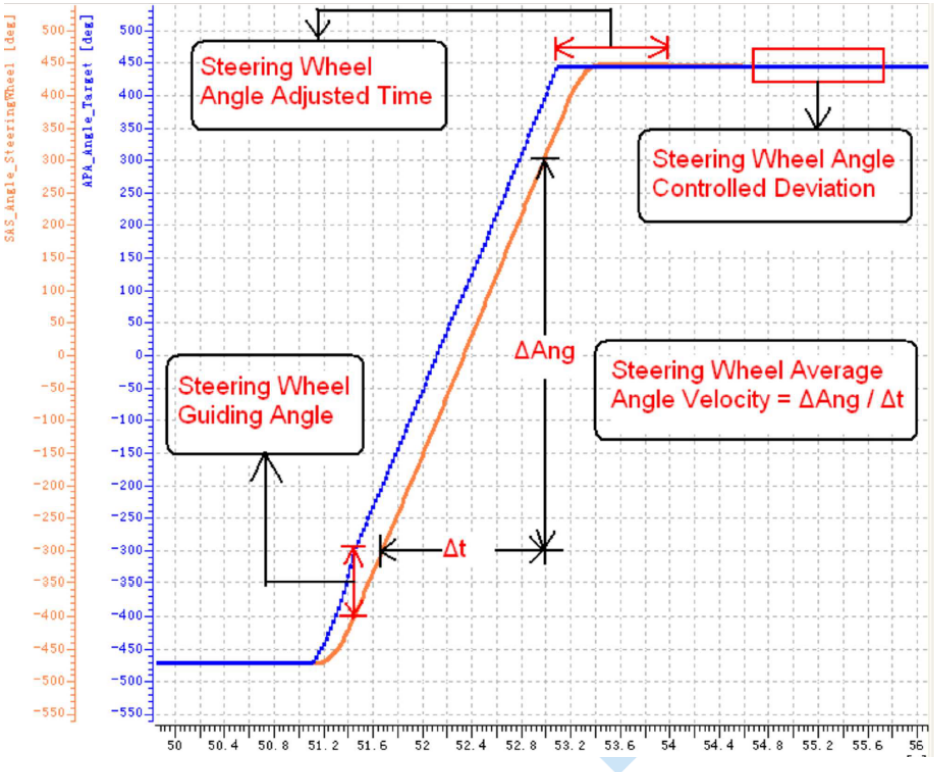
When any of the above condition applies, the EPS will leave the angle control status, and the state of EPS control will be switched to EPS_Sta_Available = 0 (Control Inhibit)

EPS angle control performance:

As shown in the figure below, where the blue line is the target angle (APA_Angle_Target) and the orange line is the actual steering wheel angle (SAS_Angle). The current difference between the two is the Steering Wheel Guiding Angle. In the initiation stage, if there is a difference, the EPS will turn the steering wheel to catch up with the target angle, and the greater the difference, the greater the output. Since there is an EPS limits its output to rotation speed of <360 deg/s., if using a signal period of 0.02 seconds, the change in value of the target angle must be <7.2 deg.

Steering Wheel Angle Adjusted Time refers to the time from when the target angle reaches the steady state to the actual steering wheel angle reaches steady state. According to the current EPS performance, it can be completed within 1s.

Steering Wheel Angle Controlled Deviation is the difference between the actual steering wheel angle and the target angle after reaching the steady state. According to the current EPS performance, it can be within 1deg.



2. EPS steering torque control:

EPS steering torque control related control signals are as following table:

Signal identification	Description	Direction
ADAS_EPS_Sta	ADAS Status	Tx
ADAS_StaReq	ADAS Status Request	Tx
ADAS_StaReq_V	ADAS Status Request Validity	Tx
ADAS_StrTqReq	Steering Torque Request	Tx
ADAS_StrTqReq_A	Steering Torque Request Applicable	Tx
CurStrTqReq	Current Steering Torque Request	Rx
CurStrTqReq_A	Current Steering Torque Request Applicable	Rx
DriIntend	Driver Intend	Rx
EPS_ADAS_Sta	EPS ADAS Status	Rx
EPSADASAbReason	EPS ADAS Abort Reason	Rx
EpasFailed	Epas Failed	Rx
Steering_TQ_Failed	Steering Torque Failed	Rx
Steering_Torque	Steering Torque	Rx

The conditions for EPS enter torque control:

1. EpasFailed = 1 (Temp Failed) or 2 (Perm Failed)
2. ADAS_Sta_Req_V = 0 (Invalid)
3. ADAS_StrTqReq > Amplitude Limitation
4. DriIntend = 2 (Driver Interrupt)
5. ADAS_StrTqReq_A = 0 (Not Applicable)
6. ADAS_Sta_Req = 0 No Request

When EPS switch status to EPS_ADAS_Sta = 1 (Control Ready), sending ADAS_Sta_Req = 1 (Request LFC/LKA Active), will switch EPS status to EPS_ADAS_Sta = 2 (LKA/LFC Control Active), at this time simultaneously sending ADAS_StrTqReq_A = 1 (Applicable) and ADAS_StrTqReq = -5 ~ 5 Nm to control the steering torque.

Conditions for EPS to leave torque control:

1. EpasFailed = 1 (Temp Failed) or 2 (Perm Failed)
2. ADAS_Sta_Req_V = 0 (Invalid)
3. ADAS_StrTqReq > Amplitude Limitation
4. DriIntend = 2 (Driver Interrupt)
5. ADAS_StrTqReq_A = 0 (Not Applicable)
6. ADAS_Sta_Req = 0 No Request

When any of the above condition applies, the EPS will leave the torque control status, and the state of EPS control will be switched to EPS_ADAS_Sta = 0 (Control Off).

EPS torque control performance:

ADAS_StrTqReq has a Guard Function, when the amplitude and gradient are 5 Nm and 5 Nm/s respectively, If this exceeds the Guard Function, it will leave the torque control state, and the EPS control state will switch to EPS_ADAS_Sta = 0 (Control Off).

3.3.3. Drivetrain

External gear and torque output control instructions, related control signals are indicated in the following table:

Signal identification	Description	Direction
ADAS_ShftPosnReq	Shifter Position Request	Tx
ADAS_ShftPosnReq_A	Shifter Position Request Applicable	Tx
ADAS_ShftPosnReq_V	Shifter Position Request Validity	Tx
ADAS_ACCStatus	ACC Status Selection Request	Tx
ADAS_WhTqReq	Wheel Torque Request	Tx
ADAS_WhTqReq_A	Wheel Torque Request Applicable	Tx
ADAS_WhTqReq_V	Wheel Torque Request Validity	Tx
ShiftGearPosn	EV Selector Position Status/ Selector Position Status Signal Failure	Rx
ADAS_WhTqReq_R	ADAS Torque Request	Rx
ADAS_WhTqReq_A_R	ADAS Torque Request Applicable	Rx
ActWheelTq	Actual Wheel Torque	Rx
DriWheelTq	Driver Demand Wheel Torque Value	Rx
MaxWheelTq	Maximum Powertrain Torque at Wheel Level	Rx
MaxWheelTq_V	Maximum Powertrain Torque (at Wheel Level) Validity	Rx
MinWheelTq	Minimum Powertrain Torque at Wheel Level	Rx
MinWheelTq_V	Minimum Powertrain Torque (at Wheel Level) Validity	Rx
ExtShiftAvail	External Shift Available	Rx
ExtTqAvail	External Torque Available	Rx
TqSource	Torque Source Status	Rx
TMSpd	EV Motor Speed	Rx
TMSpdSigFail	EV Motor Speed Signal Failure	Rx
EDSysMilLamp	EDrive System Mil Lamp	Rx
HVBattSOC	EV SOC	Rx
HVBattTemp	Temperature of HV Batt	Rx
BatPowCut	Battery power cutoff	Rx
HVBattFault	HV Battery Fault	Rx

ActAPSPosn	Accelerator Actual Position	Rx
ActAPSPosnValid	Accelerator Actual Position Validity	Rx

1. Conditions allowing autonomous controller to control gearing :
   - EV READY(EV_REDY_LAM_STA) = 1 (EV drive Ready)
   - Autonomous controller gearing command (ADAS_ShftPosnReq) = 1 (Park) or 2 (Neutral)
   - Torque command (ADAS_WhTqReq) = 0 Nm
   - Vehicle speed (VehSpeed) <= 1 kph
   - Gearing position (ShiftGearPosn) = 0 (Park) or 4 (Neutral)
   - Autonomous controller sends ADAS_ShftPosnReq_V = 1 (Valid)
   - No faults of powertrain control systems detected (EDSysMilLamp) = 0 (Off)
   - No faults of battery detected (HVBattFault) = 0 (OK)

   After all the above conditions are met, VCU responds with ExtShiftAvail = 1 (Available), sending ADAS_ShftPosnReq_A = 1 (Applicable) and ADAS_ShftPosnReq = 1 (Park), 2 (Neutral), 3 (D), 7 (Reverse) from the autonomous controller will control the gearing.
2. Conditions prohibiting autonomous controller from gearing control :
   - Autonomous controller stops sending ADAS_ShftPosnReq_A = 1 (Applicable) signal
   - Vehicle Speed > 100kph (default value for development stage)
   - Other reasons for VCU unavailable to control powertrain systems

   Any of the above conditions, will disengage gear control state and respond with ExtShiftAvail = 0 (Unavailable), and the gearing will be switched to Neutral.
3. Conditions allowing autonomous controller to enter torque control status :
   - External torque control status (ExtTqAvail) = 1 (Available)
   - ACC control status command (ADAS_ACCStatus) = 2 (Active)

- Wheel torque command validity command (ADAS_WhTqReq_V) = 0 (Valid)
- Gearing (ShiftGearPosn) = 5 (D) or 7 (Reverse)

After all the above conditions are met, the VCU will respond with TqSource = 2 (ADAS), and when the autonomous controller simultaneously send out ADAS_WhTqReq_A = 1 (Applicable) and ADAS_WhTqReq = MinWheelTq ~ MaxWheelTq it will control the vehicle output wheel torque.

4. Conditions prohibiting autonomous controller from torque control status :
   - ACC control status command (ADAS_ACCStatus) ≠ 2 (~=Active)
   - Wheel torque command validity (ADAS_WhTqReq_V) ≠ 0 (~=Valid)
   - Other reasons causing VCU to respond with external torque control status (ExtTqAvail) = 0 (Unavailable)

   Any of the above conditions, will disengage external torque control status and respond with TqSource = 0 (Internal).

3.3.4. BCM

The relevant signals for BCM body controller are shown in the following table:

Signal identification	Description	Direction
BCM_Key_Sta	Ignition Switch Status	Rx
BCM_CrashDetec_Sta	SRS Crash Signal Status	Rx
BCM_DoorLock_Sta	Door Lock Status	Rx
BCM_DoorLock_Sta_V	Door Lock Status Validity	Rx
BCM_AllDrSw_Sta	All Door Switch Status	Rx
BCM_DDrSw_Sta	Driver Door Switch Status	Rx
BCM_PDrSw_Sta	Passenger Door Switch Status	Rx
BCM_RRDrSw_Sta	RR Door Switch Status	Rx
BCM_LRDrSw_Sta	LR Door Switch Status	Rx
BCM_TGateSw_Sta	Tail Gate Switch Status	Rx
BCM_HoodSw_Sta	Hood SW Status	Rx
CSW_TurnSw_Sta	Turning Switch Status	Rx
HazardWarningReq	Hazard Warning Request	Tx
RightTurnLightReq	Right Turning Light Request	Tx
LeftTurnLightReq	Left Turning Light Request	Tx
BCM_RTurnLp_Sta	Right Turn Lamp Status	Rx
BCM_LTurnLp_Sta	Left Turn Lamp Status	Rx
SWC_CC_Sta	CC Button Status	Rx
SWC_CANCEL_Sta	CANCEL Button Status	Rx
SWC_Set_down_Sta	SET down Button Status	Rx
SWC_Res_Up_Sta	Res up Button Status	Rx
SWC_Distance_Sta	Distance Button Status	Rx

Other available signals

Signal identification	Description	Direction
TPMS_WARN_Ind	TPMS Warning Indicator	Rx
Meter_Ind_VehSpeed	Meter Indicated Vehicle Speed	Rx
CHCU_AMB_TEMP	Ambient Temperature	Rx
BCM_Bat	BCM Battery Voltage (12V)	Rx

3.3.5. Thermal management

When utilizing the cooling system of the EVKit for external hardware, it is highly recommended to consult with our engineers prior to the installation, due to the fact that it can affect the operating condition of the original thermal management and energy consumption management strategies. Thus, modification services for the electric and heat management systems are being offered as an option, to satisfy the requirements of the customers.

When integrating into the EVKit thermal management system, possible cooling sources are listed in the table below:

EVKit	Parts name	Working Temp. > 90℃	Working Temp. <75℃	Working Temp.< 50℃
Cooling circuit (high temperature)	Motor	○		
	MCU		○	
Cooling circuit (Low temperature)	PEU			○
	Battery Pack			○
	Autonomous drive processor (External hardware)			○

○ : Working temperature of parts

3.4. DBW software control interface guidelines

1. Communication standards :
   - CAN 2.0B
   - ISO 11898-1 Road Vehicle-CAN Part 1: Data Link Layer and Physical Signal.
2. CAN transceiver standard: The transceiver complies with ISO11898-2 Road Vehicles-CAN Part 2: High-speed Media Access Unit.

3. BaudRate：500kbps。
4. ID length：11 bits, do not use 29bits extended mode.
5. DLC length: fixed to 8, If the received CAN packet is incorrect (DLC≠8), signal will not be used.
6. Bits arrangement
   The bit format is in Motorola backward format. The following table illustrates the arrangement relationship between bits：

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1	63	62	61	60	59	58	57	56
2	55	54	53	52	51	50	49	48
3	47	46	45	44	43	42	41	40
4	39	38	37	36	35	34	33	32
5	31	30	29	28	27	26	25	24
6	23	22	21	20	19	18	17	16
7	15	14	13	12	11	10	9	8
8	7	6	5	4	3	2	1	0

4. Glossary

Item	Abbreviation	English	Chinese
1	ABS	Anti-lock Braking System	防鎖死煞車系統
2	ACC	Adaptive Cruise Control	自適應巡航控制
3	ACU	Autonomous Control Unit	自駕控制元件
4	ADAS	Advanced Driver Assistance Systems	先進駕駛輔助系統
5	AEB	Autonomous Emergency Braking System	自動緊急煞車系統
6	APS	Automatic Parking System	自動停車系統
7	BCM	Body Control Module	車身控制模組
8	CAN	Controller Area Network	控制器區域網路
9	DBW	Drive By Wire	線控技術
10	DC-DC	DC-DC Converter	直流轉換器
11	ECU	Electronic Control Unit	電子控制單元
12	EPB	Electrical Park Brake	電子駐車系統
13	EPD	Electronic Brake-Force Distribution	電子煞車力分配
14	EPS	Electric Power Steering	電動輔助轉向
15	ESC	Electronic Stability Control	電子穩定控制系統
16	GNSS	Global Navigation Satellite System	全球衛星導航系統
17	HUD	Head-Up Display	抬頭顯示器
18	IMU	Inertial Measurement Unit	慣性測量單元
19	IVI	In-Vehicle Infotainment System	車載資訊娛樂系統
20	MCU	Motor Control Unit	馬達控制器
21	MHI	Human Machine Interface	人機介面
22	OBC	On-Board Charger	車載充電機
23	OBD	On-Board Diagnostics System	車載診斷系統
24	PEU	Power Electronics Unit	電力電子單元
25	Rx	Receiving	訊號接收
26	SOC	State-Of-Charge	電池電量狀態
27	Tx	Transmitting	訊號傳送
28	VCU	Vehicle Control Unit	整車控制器

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