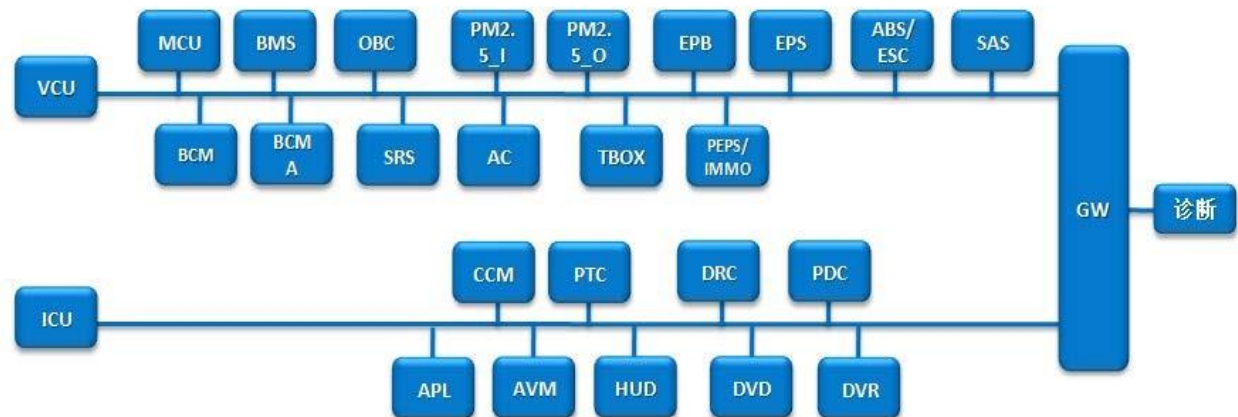


# IFL100-36-ZT MCU CAN Protocol

Date	Revision	Author	Comments
20190222	1.0	INVT	First released
20190313	2.0	MAGELEC	Added ID 0x1A1 BMS2 for BMS Added sAllowMaxRegenCharge signal (Marked in green) Added rolling counter and checksum for message BMS2 (Marked in green) Moved sAllowMaxdischarge signal to message BMS2 from BMS1 (Marked in yellow) Readjust the convention for some BMS1 signals (Marked in blue)
20190315	3.0	INVT	1. Update CAN DB matrix. MCU receive that signals bellow from VCU and BMS, they are used for system control and marked as <b>R</b> in in the matrix: VCU_TorqueReq, VehicleSate, BMS_Main_Relay_Cmd, GearLeverPos_Sts, VCU_WorkMode, VCU_MotorMode, Pre_charge_Relay_FB, Pre_charge_Finish_Sts, KeyPosition , rolling counter, checksum; The other signals from VCU and BMS that not marked, MCU only receive them not used for system control. 2. Update initvalue of sAllowMaxDischarge to 0

Terms	Description
VCU	: Vehicle Control Unit
MCU	: Motor Controller Unit
EPS	: Electric Power Steering
EPB	: Electrical Park Brake
PEPS	: Passive Entry Passive Start
ICU	: Instrument Cluster Unit
BCM	: Body Control Module
ABS	: Anti-Lock Braking System
ESP	: Electronic Stability Program
PDC	: Parking Distance Control
SRS	: Supplemental Restraint System
AVM	: Around View Monitor
LDWS	: Line Departure Warning system
HUD	: Head Up Display
PM25	: Particulate matter 2.5
AC	: Air conditioner
DVD	: Digital Video Disk
TPMS	: Tire Pressure Monitor System
IMMO	: Immobilizer
SAS	: Steering Angle Sensor
DRC	: Dynamic Rear Camera
T-BOX	: Telematics Box
OBC	: On Board Charger
CCM	: compressor control module
PTC	: Positive Temperature Coefficient
OBC	: On Board Charger
RDM	: Rear Door Module
DVR	: Driver View Record



**Note:VCU,ICU are terminals in CAN bus.**

《CAN Hardware Design Specification》

The CAN bus's terminal must terminate by the appropriate terminal resistance to prevent signal reflection

The terminal resistor's range of this network is 100 Ω~130 Ω (recommended value is 120 Ω)

CAN Message bit definition:

This document follows the 64 bits convention as specified in CAN 2.0 specification as follows:

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

To access data elements within the 64 data bits field, *Motorola Forward Lsb* convention is used,

I.e.

If a data element occupies all of byte 2 and 3 , then

- the start bit at 24
- bit length = 16

Following convention also used to define a data element:

Data name (Start bit position, Bit length)

*Note: Throughout this document, the "Start bit position" also refers to as "least significant bit (lsb)".*

Transmission speed = 500K bits/sec

ID	Transmitter	Period (ms)	Length	Description	Bit rate per second
\$101	VCU1	20	64		5,550
\$102	VCU2	20	64		5,550
\$446	VCU5				
\$410	VCU6				
\$47C	VCU7				
\$4B1	VCU8				
\$4E7	VCU9				
\$58B	PEPS1	100	64		1,110
\$51D	PEPS3				
\$5BE	PEPS4				
\$588	PEPS5				
\$553	PEPS6				
\$5F4	PEPS7				
\$5F5	PEPS8				
\$5F6	PEPS9	100	64		1,110
\$4D1	T-BOX2				
\$4D2	T-BOX3				
\$105	MCU1	10	64		11,100
\$106	MCU2	50	64		2,220
\$107	MCU3	50	64		2,220
\$1A0	BMS1	20	64		5,550
\$1A1	BMS2	20	64		5,550
\$1A2	BMS3	20	64		5,550
\$1A3	BMS4	20	64		5,550
\$1A4	BMS5	50	64		2,220
\$1A5	BMS6	50	64		2,220
\$1A6	BMS7	50	64		2,220
\$1A7	BMS8	20	64		5,550
\$392	BCM	20	64		5,550
\$393	ABCM	100	64		1,110
\$398	BCM2	20	64		5,550
\$311	ABS1	20	64		5,550
\$2EA	ABS2	20	64		5,550
\$313	ABS3	20	64		5,550
\$211	ESP1	10	64		11,100
\$213	ESP2	20	64		5,550
\$320E	EPB	20	64		5,550
\$370	OBC	500	64		222
\$31D	SRS	500	64		222
\$431	ICU	20	64		5,550
\$430	ICU	20	64		5,550
\$230	EPS	20	64		5,550
\$435	AC1	100	64		1,110
\$436	AC2	100	64		1,110
\$5EA	AC3	500	64		222
\$5B3	PTC	200	64		555
\$453	CCM	100	64		1,110
\$5A0	DVD1	100	64		1,110
\$5A1	DVD2	100	64		1,110
\$5A2	DVD3		64		
\$5A5	DVD4	100	64		1,110
\$5EB	DVD5		64		
\$5A6	DVD6	50	64		2,220
\$5A4	DVD7	100	64		1,110
\$5ED	DVD8		64		
\$6FE	APL	100	64		1,110
\$431	HUD	500	64		222
\$6A0	DVR	100	64		1,110
\$5E3	DRC	500	64		222
\$540	TPMS	500	64		222
\$5FB	PM25_1	500	64		222
\$5FC	PM25_2	500	64		222
\$525	PDC	50	64		2,220
\$428	AVM&LDWS	100	64		1,110

Total bit/sec 148,851

Total Bus load Percentage 29.77%

ID	Transmitter ECU	Period (ms)	Type	Length	Description
\$101	VCU	20	P	64 bits	VCU1

SignalName	Convention	LSB	Length	Event Trans.	Conversion	Invalid	Default/Init	Nodelist																Comment		
								VCU	MCU	BMS	OBC/DCDC	ABS	ESP	EPS	EPB	SRS	AC	CCM	BCM	DVD	AVM	ICU	PEPS		PDC	T-Box
VCU_TorqueReq	( 0 , 8 )	0	8		DataType:Num Range high:99.6 Range low:0 Conversion:(D) * 0.392 Unit:%	0xFF	0	T	R	R						R									R	扭矩请求 Torque request
VCU_MotorSpdReq	( 16, 16 )	16	16		DataType:Num Range high:16382 Range low:0 Conversion:(D) * 0.25 Unit:rpm	0xFFFF	0	T								R										转速请求 Speed request (Reserved for future)
ChangeGearAlarm	(31,1)	31	1		0:normal 1:alarm		0	T													R					预留 (Reserved)
VCU Authentication Status	(29,2)	29	2		00:Default 01:Success 10:Fail 11:Reserved		0	T														R				
Reserved	(24,5)	24	5				0	T																		
VehicleSate	( 32 , 1 )	32	1		0:Not Ready 1:Ready		0	T	R						R	R				R		R			R	整车状态 The vehicle state
Brake_Pedal_Sts	(33, 2)	33	2		00:not pressed 01:pressed 10:reserved 11:error		0	T				R				R			R		R				R	制动踏板状态 State of the brake pedal
BMS_Main_Relay_Command	( 35, 1 )	35	1		0:not work 1:work		0	T	R	R															R	高压上电指令 High Voltage power on/off instructions
GearLeverPos_Sts	( 36 , 3 )	36	3		0x00 Default 0x01 R 0x02 N 0x03 D 0x04 P 0x05 Reserved 0x06 Reserved 0x07 Reserved		0	T	R	R						R				R	R		R	R	R	档位状态 State of gear (gear selector position)
GearLeverPos_Sts_F	( 39, 1 )	39	1		0:No Error 1>Error		0	T		R						R				R		R		R	R	档位状态有效位 ( Indicates whether the GearLeverPos signal_Sts is invalid)

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ID	ransmitter EC	Period (ms)	Type	Length	Description
\$106	MCU	50	P	64 bits	MCU2

SignalName	Convention	LSB	Length	Event Trans.	Conversion	Invalid	Default/Init	Nodelist																	Comment		
								VCU	MCU	BMS	OBC/DCDC	ABS	ESP	EPS	EPB	SRS	AC	CCM	BCM	DVD	ICU	HUD	TPMS	AVM&LDWS		PEPS	T-Box
MCU_Motor_Temp	( 0, 8 )	0	8		DataType:Num Range high:210 Range low:-40 Conversion:(D) Offset:-40 Unit:℃	0xFF	0	R	T												R	R				R	电机温度 The motor temperature
MCU_hardwareTemp	( 8, 8 )	8	8		DataType:Num Range high:210 Range low:-40 Conversion:(D) Offset:-40 Unit:℃	0xFF	0	R	T																R	MCU温度 MCU temperature	
MCU_DC_MainWireOverCurrFault	(16, 1 )	16	1		0:normal 1:unusual		0	R	T																R	母线超电流报警 DC overcurrent fault	
MCU_MotorPhaseCurrFault	( 17, 1 )	17	1		0:normal 1:unusual		0	R	T																R	相电流报警 Motor phase current fault	
MCU_OverHotFault	( 18, 1 )	18	1		0:normal 1:unusual		0	R	T																R	MCU温度报警 MCU over temperature fault	
MCU_RotateTransformerFault	( 19, 1 )	19	1		0:normal 1:unusual		0	R	T																R	电机转向错误报警 Motor rotating direction fault	
MCU_PhaseCurrSensorState	( 20, 1 )	20	1		0:No Error 1>Error		0	R	T																	相电流传感器状态 The state of Phase current sensor	
MCU_MotorOverSpdFault	( 21, 1 )	21	1		0:normal 1:unusual		0	R	T																R	电机超转速报警 Motor overspeed	
Drv_MotorOverHotFault	( 22, 1 )	22	1		0:No Error 1>Error		0	R	T																R	电机温度报警 Motor over temperature	
MCU_DC_MainWireOverVoltFault	( 23, 1 )	23	1		0:normal 1:unusual		0	R	T																R	母线超电压报警 DC Overvoltage alarm	
Drv_MotorOverCoolFault	( 25, 1 )	25	1		0:normal 1:unusual		0	R	T																R	电机控制器温度过低报警-40℃ Low temperature alarm motor controller(<40℃)	
MCU_MotorSystemState	( 26, 1 )	26	1		0:No Error 1>Error		0	R	T										R						R	电机系统故障 Motor system failure	
MCU_TempSensorState	( 27, 1 )	27	1		0:No Error 1>Error		0	R	T																	MCU温度传感器状态 The state of MCU temperature sensor	

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ID	ransmitter EC	Period (ms)	Type	Length	Description																					
\$1A0	BMS	20	P	64 bits	BMS1																					
SignalName	Convention	LSB	Length	Event Trans.	Conversion	Invalid	Default/Init	Nodelist																Comment		
								VCU	MCU	BMS	OBC/DCDC	ABS	ESP	EPS	EPB	SRS	AC	CCM	BCM	DVD	ICU	HUD	TPMS		AVM&LDWS	PEPS
BMS_Warning_Level	( 0, 2 )	0	2		0:NO error 1:Level-1 error(Low) 2:Level-2 error 3:Level-3 error(High)		0	R		T							R								R	VCU will not ask for MCU reduce power at 1 level BMS warning , VCU will ask for MCU reduce 50% power at 2 level BMS warning , VCU will ask for MCU shutdown power at 3 level BMS warning ,warning lamp will flash on ICU
Batt_charge_Sts	( 2, 2 )	2	2		0:Not Charge 1:Charging 2:Charger finish 3:Standby		0	R		T							R								R	充电状态 Charging status
Negative_Relay_FB	( 4, 1 )	4	1		0:Open 1:Close		0	R		T															R	主负继电器状态反馈 state Feedback of Negative Relay
Positive_Relay_FB	( 5, 1 )	5	1		0:Open 1:Close		0	R		T							R								R	主正继电器状态反馈 state Feedback of Main Positive Relay
HighVoltLoopLockSts	( 6, 1 )	6	1		0:not lock 1:lock		0	R		T															R	高压互锁状态:检测高压面板, 维修开关, 高压充电器或者整车系统中的启停高压部件是否连接完好 High pressure interlock condition: Test high voltage panels, maintenance switch, high voltage charger or start-stop high pressure parts for connection of the vehicle system in good condition
Batt_Charge_Sts_F	( 7, 1 )	7	1		0:not error 1:error		0			T															R	
Batt_SOC_Value	( 8, 8 )	8	8		DataType:Num Range high:100% Range low:0 Conversion:(D) * 0.5 Unit:%	0xFF	0	R		T							R				R	R			R	电池电量 battery level
Batt_SOH_Value	(16, 8 )	16	8		DataType:Num Range high:100% Range low:0 Conversion:(D) * 0.5 Unit:%	0xFF	0	R		T										R					R	电池健康状态 Battery state of health

BMS_Cmd_AC_DC	( 24, 2 )	24	2		0:stop 1:normal start 2:heating start 3:reserved		0	R		T	R																											R	充电命令 Charging command
Pre_charge_Relay_FB	( 26, 1 )	26	1		0:Open 1:Close		0	R	R	T																												R	预充继电器反馈状态 Prefilled relay feedback status
Fast_charge_Relay_FB	( 27, 1 )	27	1		0:Open 1:Close		0	R		T																												R	快充继电器反馈状态 Quick charge relay feedback status (reserved)

Pre_charge_Finish_Sts	( 28, 1 )	28	1		0:not finish 1:finish		0	R	R	T									R					R	预充完成反馈状态 Pre - charge Complete Feedback Status
Pre_charge_Finish_Sts_F	( 29, 1 )	29	1		0:not error 1:error		0	R		T									R					R	预充有效位 Pre - charge valid bit alarm
BMS_Req_Mode	( 30, 2 )	30	2		0:Standby Mode 1:Power On Mode 2:Power Off Mode 3:Reserved		0	R		T									R					R	<p>BMS请求模式 ( 1.Power On Mode: 指的是BMS在12V给定的条件下, 电池组可以上强电(比如允许车载充电机给电池组充电, 电池包可以输出高压给电机控制器等电控模块);</p> <p>2. Power Off Mode: 指的是没有高压输入输出(比如无车载充电机给电池组充电或电池包没有高压输出);</p> <p>3. Standby Mode: 分为两种情况: (1).慢充模式: 此情况指的是PTC加热完成到充电开始转换的空闲时间, (2).行车模式: 此情况指的是BMS判断预充完成到请求VCU允许上高压这段时间.)</p> <p>BMS request mode:</p> <p>1. Power On Mode: <a href="#">Refers to the BMS in the 12 v given conditions, the battery can be connected to high voltage</a> (Such as allowing car charger to recharge the battery pack, battery pack can output high voltage to the motor controller and other electrical control module)</p> <p>2. Power Off Mode: <a href="#">that's mean no high voltage input and output</a>(Such as no car charger to recharge the battery pack or battery pack is no high voltage output)</p> <p>3. Standby Mode: Divided into two cases: (1). Slow filling mode: This refers to the PTC heating charging to start conversion of free time</p> <p>(2). Run models: This refers to the BMS judgment pre filled complete to request VCU allows high pressure during this time</p>
BMS_Allow_Max_Discharge	( 40, 14 )	40	14		DataType:Num Range high:800A Range low:-500 Conversion:(D) * 0.1 Offset:-500 Unit:A	0x1FFF	0x1388	R		T														R	允许最大放电电流 Allow the maximum discharge current

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ID	Transmitter ECU	Period (ms)	Type	Length	Description																								
\$1A1	BMS	20	P	64 bits	BMS2																								
SignalName	Convention	LSB	Length	Event Trans.	Conversion	Invalid	Default/Init	Nodelist																		Comment			
								VCU	MCU	BMS	OBC/DCDC	ABS	ESP	EPS	EPB	SRS	AC	CCM	BCM	DVD	ICU	HUD	TPMS	AVM&LDWS	PEPS		T-Box		
sAllowMaxDischarge	( 8, 16 )	8	16		DataType:Num Range high:800A Range low:0 Conversion:(D) * 0.1 Offset:-500 Init. Value:0 Unit:A	0x1FFF	0x1388	R	R	T																R	电池允许最大放电电流 Battery allow the maximum discharge current		
sAllowMaxRegenCharge	( 24, 16 )	24	16		DataType:Num Range high:800A Range low:0 Conversion:(D) * 0.1 Offset:-500 Init. Value:0 Unit:A	0x1FFF	0x1388	R	R	T																R	电池允许最大再生充电电流 Battery allow the maximum regen charge current		
RollingCounter	( 48, 4 )	48	4		DataType:Num Range high:15 Range low:0 Conversion:(D) Unit:		0	R	R	T																R			
Checksum	( 56, 8 )	56	8		DataType:Num Range high:0xFF Range low:0 Conversion: Unit:			R	R	T																R	checksum=(byte0+byte1+byte2+byte3+byte4+byte5+byte6) XOR 0xFF		

ID	Transmitter ECU	Period (ms)	Type	Length	Description
\$431	ICU	20	P	64 bits	ICU

SignalName	Convention	LSB	Length	Event Trans.	Conversion	Invalid	Default/ Init	Nodelist																						Comment			
								VCU	MCU	BMS	ABS	ESP	SAS	EPS	EPB	SRS	PEPS	AVM&LDWS	DRC	DVD	TPMS	BCM	ICU	HUD	RDM	T-BOX	PDC	AC	SPC		PM2.5-O	PM2.5-I	DWS
ParkBrake	( 0, 1 )	0	1	NO	1:Parked 0:NotParked		0	R										R			R	T			R	R							HandBrake
Vacuum	( 1, 1 )	1	1	NO	0:On 1:Off		0															T				R							0:Warning 1:No Warning
AirFilter	( 2, 1 )	2	1	NO	0:OK 1:Failure		0															T											
BrakeFluidLevel	( 3, 1 )	3	1	NO	0:Normal 1:LowLevel		0				R	R										T			R								
ICU_ Fault	( 4, 1 )	4	1	NO	0: no fault 1: fault		0															T			R								
RollingCounterICU	( 5, 1 )	5	1	NO	DataType:Num Range high:1 Range low:0 Conversion:(D) Unit:		0															T											0-1-0-1.....
AirbagAlarmLampStatus	( 6, 2 )	6	2	NO	00: No failure 01: Failure 02:NotUsed 03:Invalid	0x3	0									R						T											
FuelVolume	( 8, 8 )	8	8	NO	DataType:Num Rang high:100 Rang low:0 Converction:(D) Unit::%		0															T			R								
TotalOdometer_km	( 36, 20 )	36	20	NO	DataType:Num Rang high:999999 Rang low:0 Converction:(D) Unit::km	0xFFFF															R	T			R								Display_TotalOdometer_km
ReverseGearSwitch	( 35, 1 )	35	1	NO	0:No Reverse Gear 1:Reverse Gear		0					R			R		R	R	R		R	T				R	R						ICU will always send the signal for MT and AT.
NeutralGearSwitch	( 34, 1 )	34	1	NO	0:No Neutral Gear 1:Neutral		0					R			R		R					T				R							Only for MT.
PassSeatBeltStatus	( 32, 2 )	32	2	NO	0:Not Configured 1:Fault 2:NotBulked 3:Bulked		0								R							T	R		R								
DriverSeatBeltStatus	( 46, 2 )	46	2	NO	0:Not Configured 1:Fault 2:NotBulked 3:Bulked		0					R	R		R	R						T	R		R							R	
ReverseGearSwitchValidD	( 45, 1 )	45	1	NO	1:Valid 0:Not valid							R			R		R	R	R		R	T				R	R						
NeutralGearSwitchValidDa	( 44, 1 )	44	1	NO	1:Valid 0:Not valid							R			R		R					T				R							

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