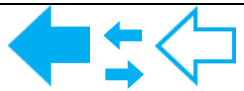
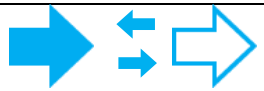
1 CAN-BUS PROTOCOL

Data Field Structure

CAN Identifier	Data Field (8 bytes)							
29 bits	byte 1	byte 2	byte 3	byte 4	byte 5	byte 6	byte 7	byte 8

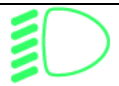
Below table are the required CAN-Bus protocols. The image file (.png format) for the icons will be provided by ST Kinetics.

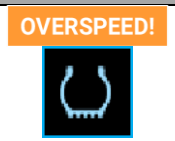
Description	ICON	Name	PGN (hex)	Priority	SA (hex)	SPN	Byte	Bits	Parameters /resolution	Range	rep (ms)	System	Status
Turn Signal Left Icon to be flashing		Turn indicator - left	FE40 / 65088	6	A0		2	8-7	00 De-activated 01 Activated 10 Fault Detected 11 Not Available	NA	500	DIP	checked
Turn Signal Right Icon to be flashing		Turn Indicator - right	FE40 / 65088	6	A0		2	6-5	00 De-activated 01 Activated 10 Fault Detected 11 Not Available	NA	500	DIP	checked
CTIS - Highway		Tire Pressure Control Unit Current Pressures - Current Terrain Mode	FE79 / 65145	7	33		7	3-1	000 - Road (Highway)	NA	5000	CTIS	checked
CTIS - Cross Country									001 - Track/Trail (X-Country)				checked
CTIS - Mud/Sand/Snow									010 - Sand/Mud/Snow				checked
CTIS - Emergency									011 - Emergency/Critic				checked
CTIS - Mode change in progress		Tire Pressure Control Unit Target Pressures - Selected Terrain Mode	FE7A / 65146	7	33		7	3-1	000 - Road (Highway) 001 - Track/Trail (X-Country) 010 - Sand/Mud/Snow 011 - Emergency/Critic 100 - Not Defined 101 - Not Defined 110 - Not Defined 111 - Unknown	NA	5000	CTIS	TBC

Description	ICON	Name	PGN (hex)	Priority	SA (hex)	SPN	Byte	Bits	Parameters /resolution	Range	rep (ms)	System	Status
Diff Lock – TCase lock	NA	T-Case Lock switch	FF6F / 65391		B7		2	2-1	0: TC Lock OFF 1: TC Lock ON 2: Reserved 3: Fault	NA	500	MCM	checked
Diff Lock – Axle lock	NA	Axle Lock switch	FF6F / 65391		B7		2	4-3	0: Axle Lock OFF 1: Axle Lock ON 2: Reserved 3: Fault	NA	500	MCM	checked
Diff Lock State	NA	Diff Lock State – Axle 1	F006 / 61446		B7		2	2-1	00 Differential lock disengaged 01 Differential lock engaged 10 Error 11 Not available	NA	500	MCM	checked
Diff Lock State	NA	Diff Lock State – Axle 2	F006 / 61446		B7		2	4-3	00 Differential lock disengaged 01 Differential lock engaged 10 Error 11 Not available	NA	500	MCM	checked
Diff Lock State	NA	Diff Lock State – Axle 3	F006 / 61446		B7		2	6-5	00 Differential lock disengaged 01 Differential lock engaged 10 Error 11 Not available	NA	500	MCM	checked
Diff Lock State	NA	Diff Lock State – Axle 4	F006 / 61446		B7		2	8-7	00 Differential lock disengaged 01 Differential lock engaged 10 Error 11 Not available	NA	500	MCM	checked
Diff Lock State	NA	Diff Lock State – Central	F006 / 61446		B7		3	2-1	00 Differential lock disengaged 01 Differential lock engaged 10 Error 11 Not available	NA	500	MCM	checked
DIFF Lock - Highway	 HW	Diff-Lock - Current Terrain Mode	NA	NA	NA	NA	NA	NA	TCase Lock = OFF Axle Lock = OFF	NA	NA	NA	checked
DIFF Lock - Cross Country	 CC	Diff-Lock - Current Terrain Mode	NA	NA	NA	NA	NA	NA	TCase Lock = ON Axle Lock = OFF	NA	NA	NA	checked
DIFF Lock - Emergency	 EMER	Diff-Lock - Current Terrain Mode	NA	NA	NA	NA	NA	NA	TCase Lock = ON Axle Lock = ON	NA	NA	NA	checked

Description	ICON	Name	PGN (hex)	Priority	SA (hex)	SPN	Byte	Bits	Parameters /resolution	Range	rep (ms)	System	Status
DIFF Lock – Mode change in progress	 HW -> CC	Diff-Lock – Selected Terrain Mode	FF81	6	B0		2	7-5	Conditions: Axle Lock = ON Diff Lock State – Axle 1 != 01 Diff Lock State – Axle 2 != 01 Diff Lock State – Axle 3 != 01 Diff Lock State – Axle 4 != 01	NA	200	MCM	TBC
	 HW -> EMER								Conditions: Axle Lock = ON Diff Lock State – Axle 1 != 01 Diff Lock State – Axle 2 != 01 Diff Lock State – Axle 3 != 01 Diff Lock State – Axle 4 != 01				TBC
	 CC -> HW												TBC
	 CC->EMER												TBC
	 EMER-> HW												TBC
	 EMER -> CC												TBC
Vehicle Speed iDDP software to do KM/H to MPH conversion when required.		Wheel base vehicle speed	FEF1 / 65265	6	0	84	2-3	16-1	1/256 km/h per bit	0 to 250.996 km/h	100	Engine	checked
Transmission Manual Model Indicator			ETC7/ 65098	6	03		7	8, 7	00b – Transmission not in a Manual Mode 01b – Transmission in a Manual Mode 10b – Reserved 11b – Not available		100	TCM	

Description	ICON	Name	PGN (hex)	Priority	SA (hex)	SPN	Byte	Bits	Parameters /resolution	Range	rep (ms)	System	Status
Gear – N	N	Neutral Gear	F005 / 61445	6	3	524	1	8-1	Transmission Selected Gear Resolution: 1 gear value/bit gain Offset: -125 offset Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral Transmission Manual Model Indicator : **MANUAL ON (01b)** R = 124 R2 = 123 N = 125 L = 126 D2 = 127 D3 = 128 D4 = 129 D5 = 130 D6 = 131 D7 = 132 Transmission Manual Model Indicator : **MANUAL OFF (00b)** **:Reserved (10b)** **:Not Available (11b)** R = 124 R2 = 123 N = 125 L = 126 D = 127-132	-125 to 125	100	Transmission	checked
Gear – R1	R	Reverse Gear											
Gear – R2	R2	2nd Reverse Gear											
Gear – D	D	Automatic 6th Gear											
Gear – L	L	Low Gear											
Gear – D2	D2	Second Gear											
Gear – D3	D3	Third Gear											
Gear – D4	D4	Fourth Gear											
Gear – D5	D5	Fifth Gear											
Gear -D6	D6	Sixth Gear											
Gear – D7	D7	Seventh Gear											

Description	ICON	Name	PGN (hex)	Priority	SA (hex)	SPN	Byte	Bits	Parameters /resolution	Range	rep (ms)	System	Status
Park Brake Icon to be flashing when gear is not at Neutral Gear, “N”.		Park brake	64964	6	0B		4	2-1	00 – Parking Brake Actuator not fully activated 01 – Parking Brake Actuator fully activated 10 – Error 11 – Not available	NA	200	EBS	Checked
Fault Icon Icon to be flashing		Vehicle Warning Icon	FF20	6	B4		1	1	0 – Off 1 – On	NA	200	E-DIP	
Low Fuel Indicator		Fuel level low	65391	6	B7		3	2-1	0: OK **1: Low warning** 2: Critical low warning 3: Fault	NA	200		Checked
		Fuel level critical low	65391	6	B7		3	2-1	0: OK 1: Low warning **2: Critical low warning** 3: Fault	NA	200		Checked
Low Beam Indicator		Low Beam	65088	6	B1		1	6-5	00 De-activated 01 Activated 10 Fault Detected 11 Not Available	NA	200	DIP	Checked
High Beam Indicator		High Beam	65088	6	B1		1	8-7	00 De-activated 01 Activated 10 Fault Detected 11 Not Available	NA	200	DIP	Checked
Camera Cleaning – Purge Water		Purge Water	64973				6	3-1	000 De-activated 001 Activated	NA	200	VSR	
Camera Cleaning – Purge Air		Purge Air	64973				6	6-4	000 De-activated 001 Activated	NA	200	VSR	

Pitch Display data either from VNS and RHCS depending on Pitch/Roll Configurator Border shall be flashing amber or red if exceed limits Amber warning : ±28deg Red warning : ±30.96deg		Tilt Sensor, Pitch (VNS)	61459	6	B4		2-1	16-1	0.002 deg per bit	-64 to 64.51 degree "+" value = Green line move down	200	PLS	Checked
		~~Tilt Sensor, Pitch (RHCS)~~	~~FF77~~	~~6~~	~~2F~~		~~1-2~~	~~16-1~~	~~Resolution : 1 count per bit Data Range : 3686 to 410 Slope : 0.001221 Offset : 5.0006105 Conversion formula to degree = (ASIN((((COUNT*SLOPE+OFFSET)/5) 0.5)/0.8))*(180/PI())~~	~~-30 to 30 "+" value = Green line move down~~	~~100~~	~~RHCS~~	~~Sensor~~
Roll Display data either from VNS and RHCS depending on Pitch/Roll Configurator Border will flash amber or red if exceed limits Amber warning : ±15deg Red warning : ±16.7deg		Tilt Sensor, Roll (VNS)	61459	6	B4		4-3	16-1	0.002 deg per bit	-64 to 64.51 degree "+" value = Rotate clockwise	200	PLS	Checked
		~~Tilt Sensor, Roll (RHCS)~~	~~FF77~~	~~6~~	~~2F~~		~~3-4~~	~~16-1~~	~~Resolution : 1 count per bit Data Range : 3686 to 410 Slope : 0.001221 Offset : 5.0006105 Conversion formula to degree = (ASIN((((COUNT*SLOPE+OFFSET)/5) 0.5)/0.8))*(180/PI())~~	~~-30 to 30 "+" value = Rotate clockwise~~	~~100~~	~~RHCS~~	~~Sensor~~
~~Pitch/Roll Configurator~~	~~NA~~	~~Pitch/Roll Select (Configuration)~~	~~FF20~~	~~6~~	~~B4~~		~~1~~	~~6~~	~~0 - Use VNS Pitch & Roll 1 - Use RHCS Pitch & Roll~~	~~NA~~	~~200~~	~~E-DIP~~	~~IDDP~~
Overspeed - CTIS Overspeed or - DIFF Lock Overspeed Overspeed ICON will be flashing. CTIS and DIFF Lock Icons will	 HW	CTIS Overspeed	FF20	6	B4		1	2	0 - Normal 1 - Overspeed	NA	200	E-DIP	IDDP

be flashing amber depending which one is overspeed.	 HW	Diff-Lock Overspeed	FF20	6	B4		1	3	0 - Normal 1 - Overspeed	NA	200	E-DIP	IDDP
Speed Unit (KM/H or MPH)		Distance unit (Configuration)	FF20	6	B4		1	5-4	00 - km per hour 01 - miles per hour 10 - Reserved 11 - Reserved	NA	200	E-DIP	IDDP
Icon Flashing Timing. Reference sync for all flashing icons. To meet requirement that all vehicle flashing icons must be in sync. Any iDDP system delay will be offseted by vehicle system. iDDP to ensure that the delay is a constant value. If reference sync is not received. iDDP to generate own flashing timing of 0.4s on and 0.4s off.	NA	Flashing Timing Sync	FF20	6	B4		1	8	0 - Flash Off 1 - Flash On	NA	200	E-DIP	IDDP
Vehicle Variant When in swim variant, swim icon ON, when in Land variant, swim icon OFF													
Cruise Control		Cruise Control Enable Switch	6526 5		0								
		Cruise Control Active											
		Cruise Control Resume Switch											
		Cruise Control Set Speed											

Combat Override	**Combat Override Active!**		65391				2	6-5					
Exhaust Brake			65391										
Hill Holder													